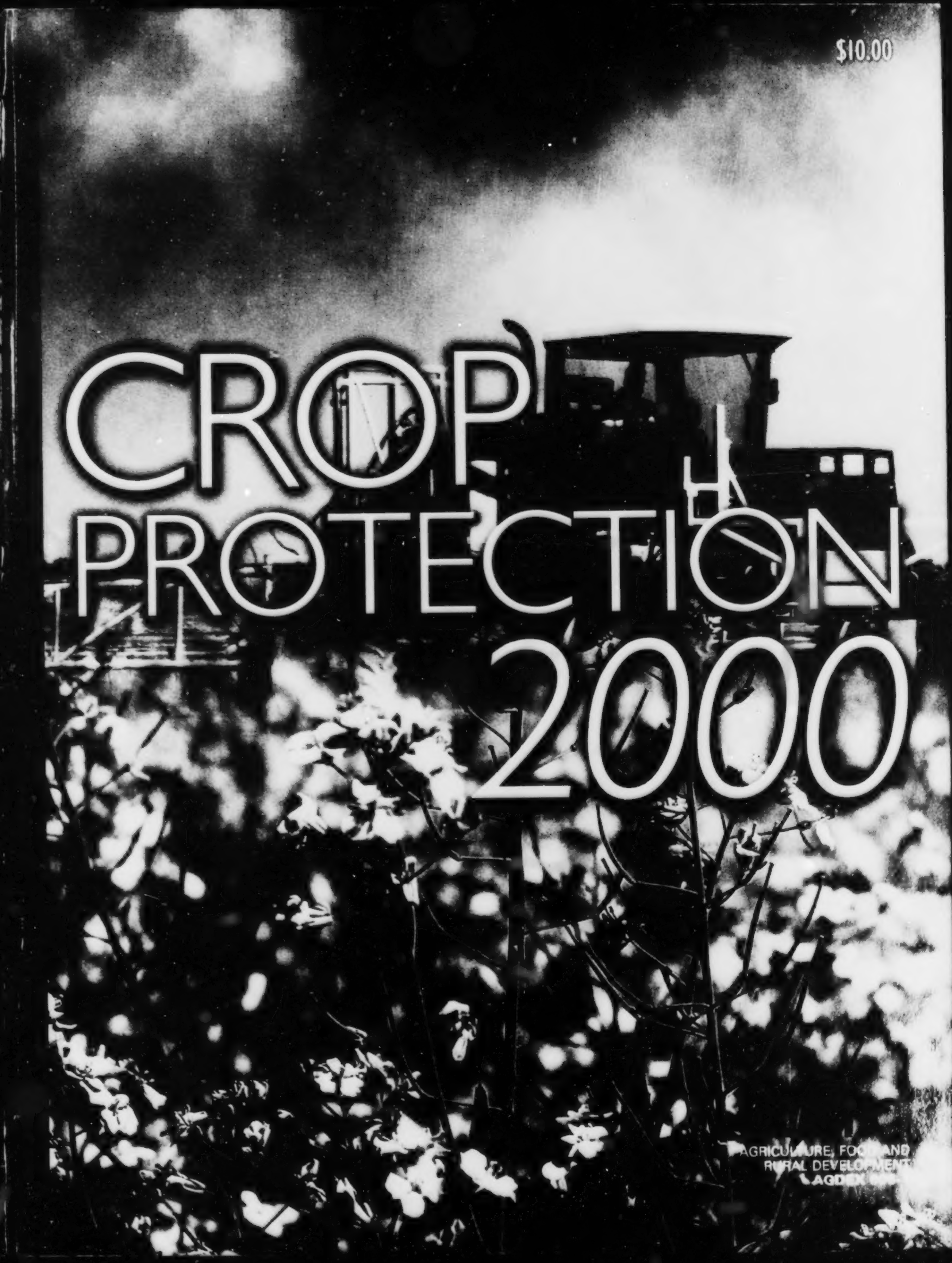

$10.00

CROP PROTECTION 2000

AGRICULTURE, FOOD AND
RURAL DEVELOPMENT
AGDEX [illegible]

Disclaimer

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Note: Some approved minor use registrations may not appear on the product label.
Check with product write-up for details.

All recommendations in this publication are given in quantity of commercial product per acre (L or kg/ac). **Product labels are given in quantity of product per hectare (L or kg/ha). To avoid application errors, be sure to read and understand label recommendations.**

Warning
The use of a pesticide in any manner not published on the label or registered under the *Minor Use of Pesticides* regulation constitutes an offence under both the *Federal Pest Control Products Act* and *Alberta's Environmental Protection and Enhancement Act*.

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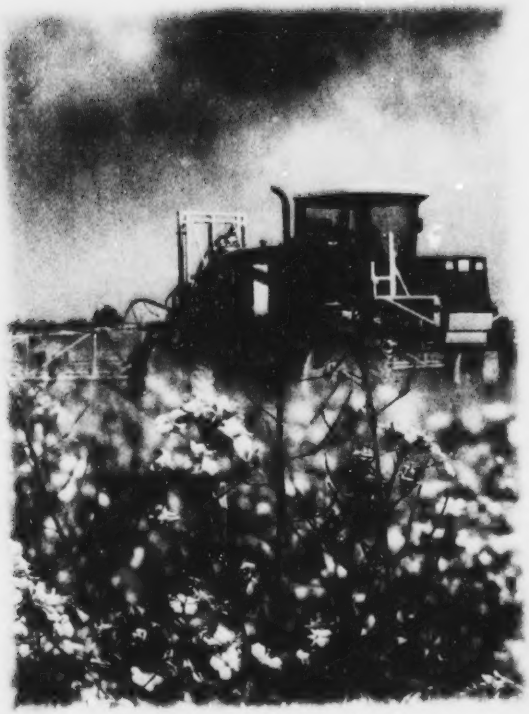

Crop Protection 2000

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Address and Telephone Numbers

Chemical Companies

Abell Pest Control Inc.
636 Notre Dame Avenue
Winnipeg, MB. R3B 1S9
Tel: (204) 783-3396 Fax: (204) 783-6925

Aventis Crop Science Canada
295 Henderson Drive
Regina, SK. S4N 6C2
(306) 721- 4500 Toll Free: 1-800-667-5959

BASF Canada Inc.
345 Carlingview Drive
Toronto, ON. M9W 6N9
(416) 675-3611 Toll Free: 1-877-371-2273

Bayer Inc.
57 Armstrong Crescent
Leduc, AB. T9E 5G3
1-877-938-3737

Bell Laboratories Inc.
3699 Kinsman Blvd.
Madison, WI. 53704, USA
(608) 241-0202

Burlington Bio-Medical & Scientific Corp.
91 Carolyn Blvd.
Farmingdale, N.Y. 11735, USA
(516) 694-9000

Ceva Laboratories & Co.
610 - 7101 College Blvd.
Overland Park, KS. 66210, USA
(913) 451-3434

Cheminova Canada
5915 Airport Road, Suite 316
Mississauga, ON. L4V 1T1
(905) 405-1923
Toll Free: 1-888-316-6260

Cyanamid Crop Protection
88 McNabb Street
Markham, ON. L3R 6E6
Toll Free: 1-800-387-5073

Dexol Industries
Apache Seed Co.
10136 - 149 Street
Edmonton, AB. T5T 1L1
(780) 489-4245 or (780) 489-0606

Dow Agrosciences Canada Inc.
9635 - 45 Avenue
Edmonton, AB. T6E 5Z8
Ag. Products
(780) 431-8925 Toll Free: 1-800-667-3852
Industrial Products
(403) 735-8800

DuPont Canada Inc.
4444 - 72 Avenue S.E.
Calgary, AB. T2C 2C1
Toll Free: 1-800-667-3925

Elston Equipment Co. Inc.
Goodwin Enterprises
R.R. 2
Sundre, AB. T0M 1X0
(403) 638-3215

Garden City Ag Supplies
3895 - 9th Avenue N
Lethbridge, AB. T1H 6G8
Tel: (403) 320-8101 Fax: (403) 320-8041

Gustafson (Uniroyal Chemical Ltd.)
#10, 2712 - 37 Avenue N.E.
Calgary, AB. T1Y 5L3
(403) 250-9481
24 Hour Emergency: (519) 744-3060

Interprovincial Co-operatives Ltd.
945 Marion Street
Winnipeg, MB. R2J 0K7
(204) 233-3461

K-9 Cattle Company
Box 1422,
Prince Albert, SK. S6V 5S9
(306) 764-8102

M121

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Monsanto Canada Inc.
#707 - 5010 43rd Street
Red Deer, AB. T4N 6H2
1-800-667-4944

Norac Concepts Inc.
P.O. Box 62023
Orleans, ON K1C 7H8
(613) 841-2907

Novartis Crop Protection Canada Inc.
850 Southland Tower
10655 Southport Road S.W.
Calgary, AB. T2W 4Y1
Toll Free: 1-800-315-2422
Emergency No.: 1-800-267-6351

Nufarm Agriculture Inc.
5507 First Street S.E.
Calgary, AB. T2H 1H9
1-800-868-5444

Peacock Industries Inc.
1210 - 410 - 22nd Street E.
Saskatoon, SK. S7K 5T6
(306) 242-5333

Rohm and Haas Canada Inc.
3633, Pipeline Road
West St. Paul, MB. R4A 8A2
(204) 339-7229
Toll Free: 1-800-268-4201

NuGro
10 Craig Street
Brantford, ON N3T 7J1
1-800-461-7356

United Agri Products
820 - 26 Street N.E.
Calgary, AB. T2A 2M4
Customer Service: 1-800-561-5444
24 Hour Emergency: 1-800-561-8273

Van Waters and Rogers Ltd.
4220 - 78 Avenue S.E.
Calgary, AB. T2C 2Z5
(403) 236-4009

Wilson Laboratories Inc.
36 Head Street
Dundas, ON. L9H 3H3
(416) 627-9205

Zeneca Agro
#250, 3115 - 12 Street N.E.
Calgary, AB. T2E 7J2
(403) 219-5400
Grower Hotline: 1-800-665-9250

Pest Management Regulatory Agency

The Pest Management Regulatory Agency (PMRA) of Health Canada is responsible for providing safe access to pest management tools, such as pesticides and sustainable pest management strategies, while minimizing risks. The Agency registers all pest control products that may be used in Canada. It also re-evaluates the existing pesticides available to the agriculture, forestry, manufacturing and other sectors. PMRA's risk-management approach to regulatory decision-making involves objective, scientific assessment of the risks to human health and the environment, while considering the need for a pest control product. With this approach, growers and consumers are better protected and have access to the information regulatory decisions are based on.

If there are questions or inquiries regarding pesticides, product labels or safety precautions, contact PMRA at the following phone numbers:

Edmonton 780/495-7014
Calgary 403/292-4106, 403/292-4411
Lethbridge 403/382-4794

National toll free number 1-800-267-6315 – Pest Management Information Service
Visit our website: www.hc-sc.gc.ca/pmra-arla

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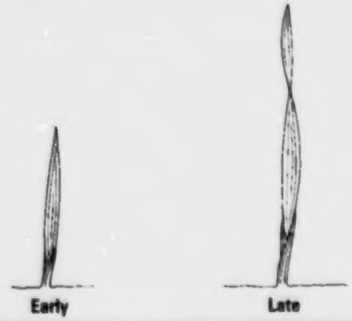
Calgary 403/292-4106
403/292-4411
Lethbridge 403/382-4794

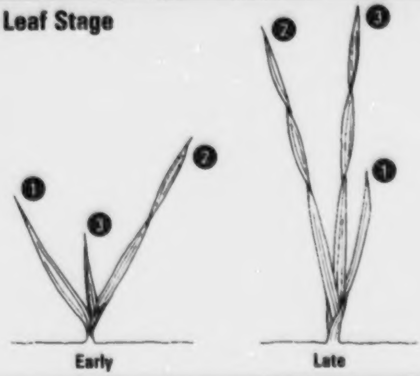
National toll free number 1-800-267-6315 -- Pest Management Information Service
Visit our website: www.hc-sc.gc.ca/pmra-arla

Leafstages — Cereals and Grasses

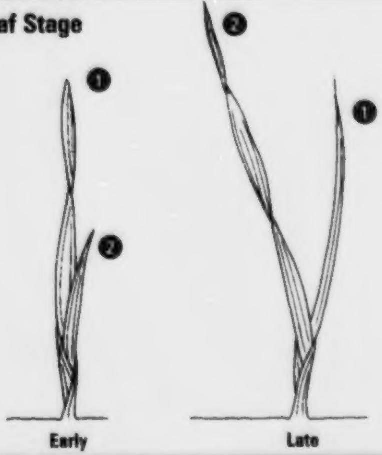
One Leaf Stage



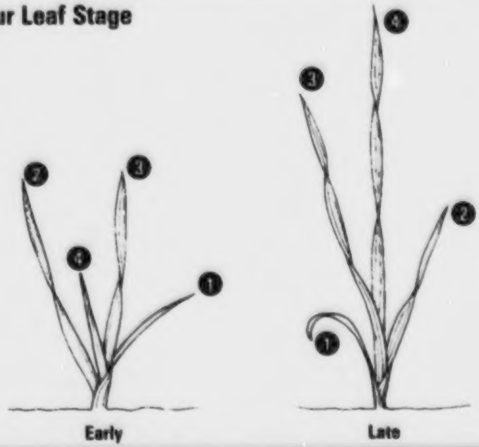
Three Leaf Stage


②
③
①
②
③
①
Early
Late

Two Leaf Stage

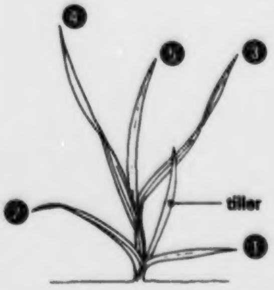

②
①
①
②
Early
Late

Four Leaf Stage


④
③
②
③
②
④
①
①
Early
Late

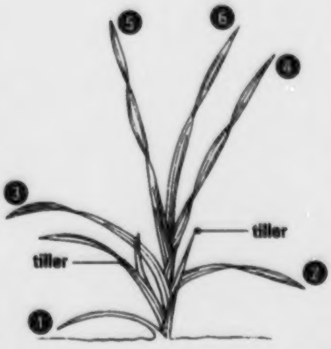
Five Leaf Stage

with one tiller

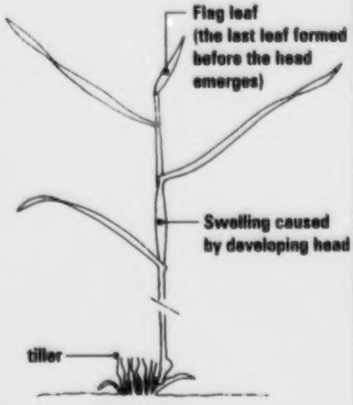

④
⑤
③
tiller
②
①

Six Leaf Stage

with two tillers

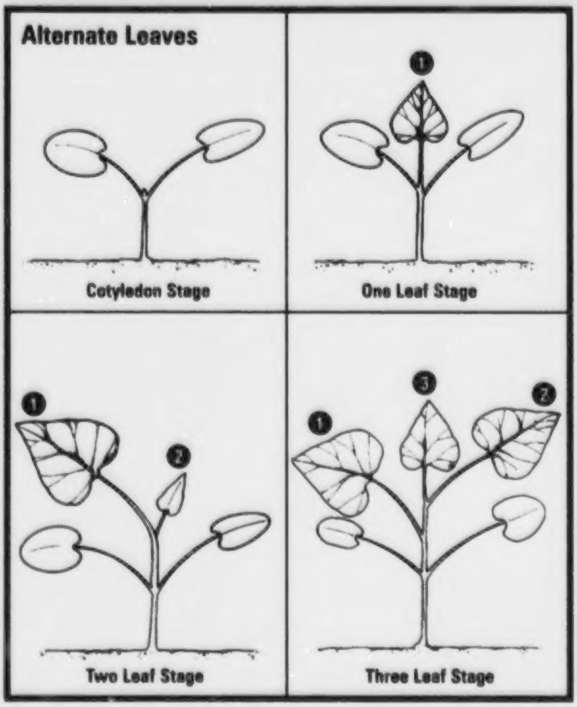

⑤
⑥
④
③
tiller
tiller
②
①

Cereal - Early Boot Stage


Flag leaf
(the last leaf formed before the head emerges)
Swelling caused by developing head
tiller

Leafstages — Broadleaf Weeds

Alternate Leaves



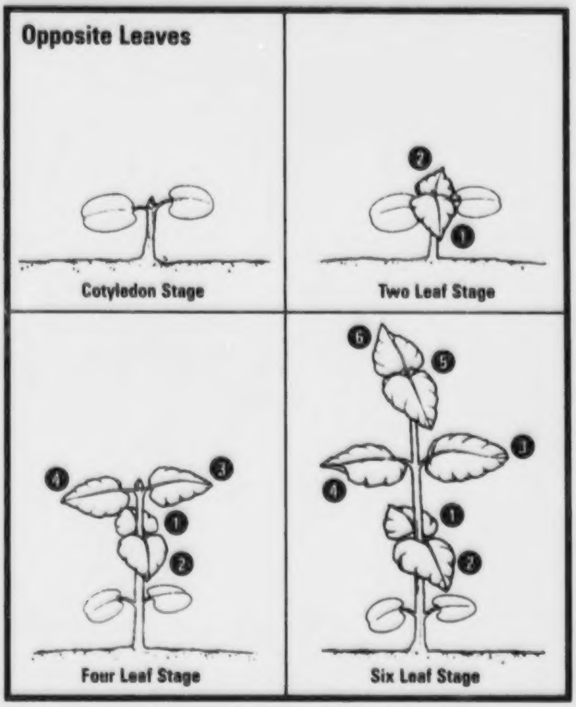
Cotyledon Stage

One Leaf Stage

Two Leaf Stage

Three Leaf Stage

Opposite Leaves



2
1
6
5
4
3
3
4
1
2
1
2

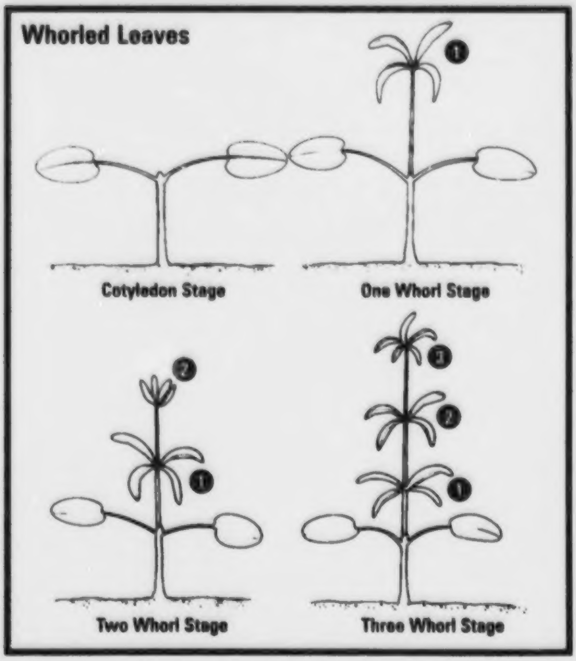
Cotyledon Stage

Two Leaf Stage

Four Leaf Stage

Six Leaf Stage

Whorled Leaves



Cotyledon Stage

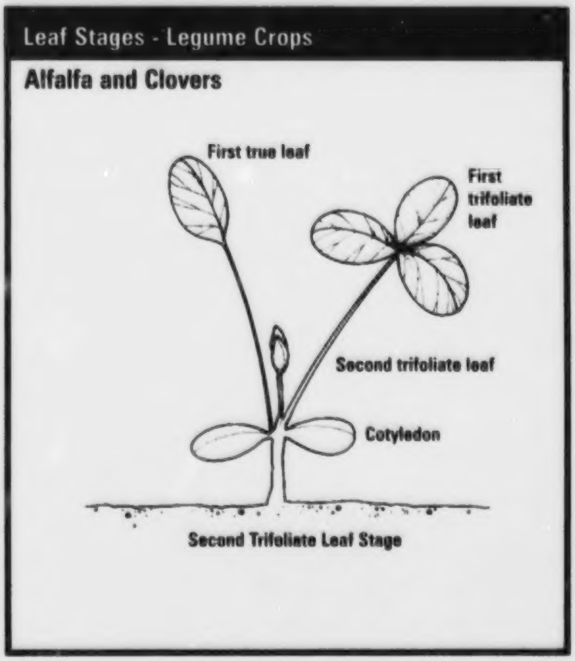
One Whorl Stage

Two Whorl Stage

Three Whorl Stage

Leaf Stages - Legume Crops

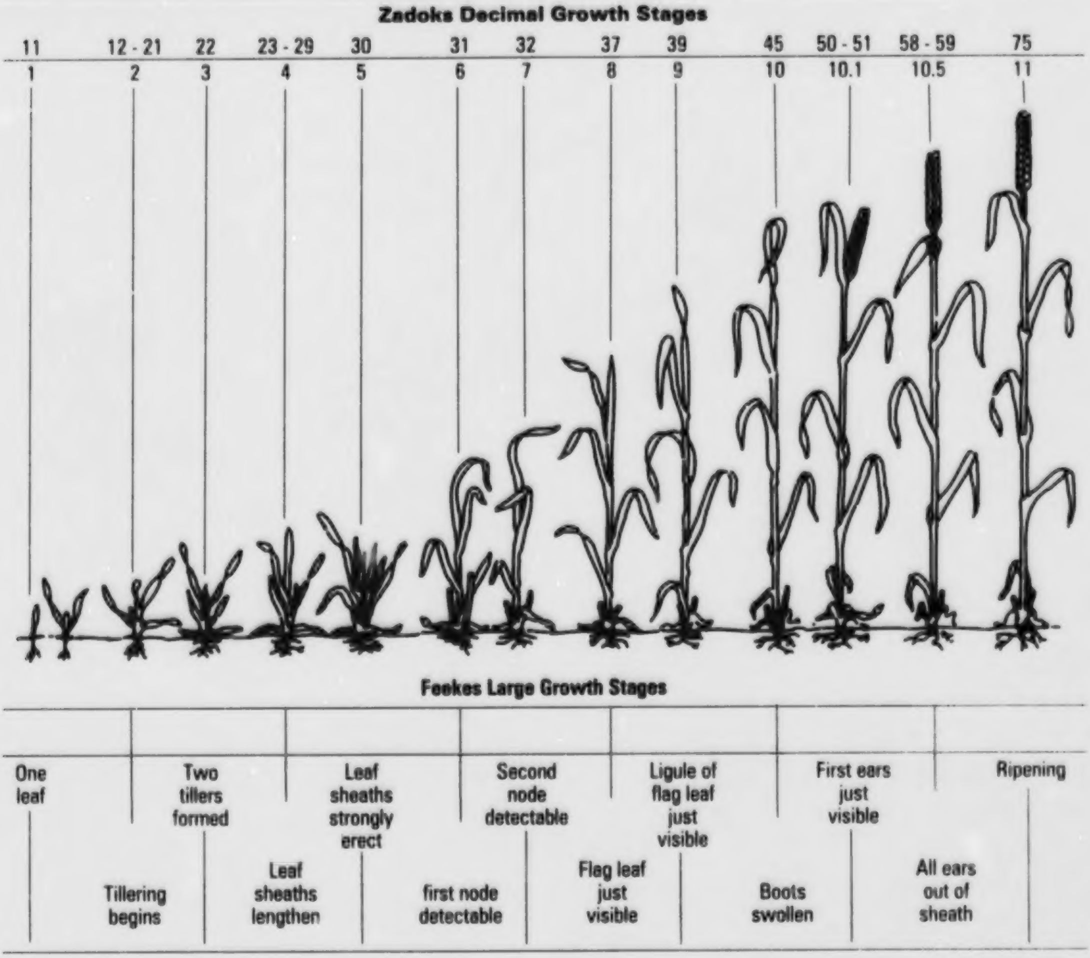
Alfalfa and Clovers



First true leaf
First trifoliate leaf
Second trifoliate leaf
Cotyledon

Second Trifoliate Leaf Stage

Cereal Growth Stages


Zadoks Decimal Growth Stages
11
12 - 21
22
23 - 29
30
31
32
37
39
45
50 - 51
58 - 59
75
1
2
3
4
5
6
7
8
9
10
10.1
10.5
11
Feekes Large Growth Stages
One leaf
Two tillers formed
Leaf sheaths strongly erect
Second node detectable
Ligule of flag leaf just visible
First ears just visible
Ripening
Tillering begins
Leaf sheaths lengthen
first node detectable
Flag leaf just visible
Boots swollen
All ears out of sheath

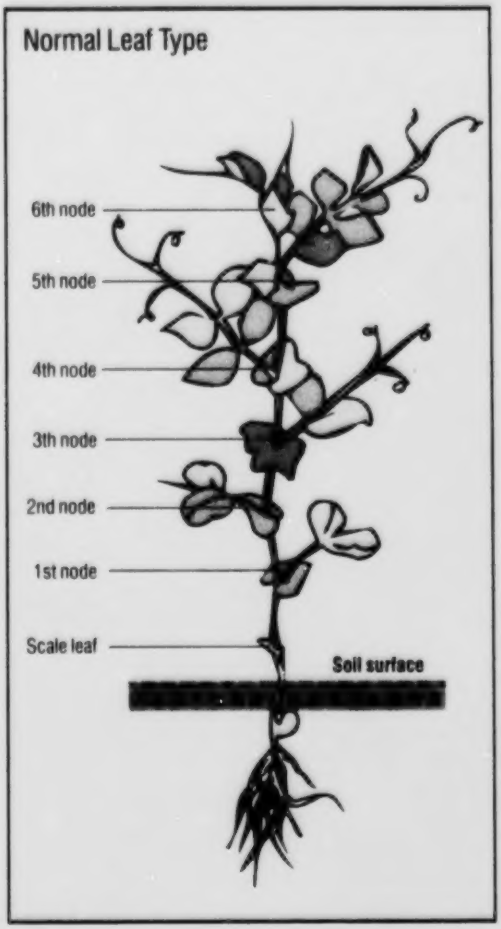
The Feekes and Zadoks scales define the growth stages of a relatively uniform cereal crop. Completion of these growth stages by the cereal crop will be influenced greatly by soil temperature, moisture, air temperature and day length. For example, stages 2-5 in the Feekes scale may take 5 or 6 weeks, whereas stages 6-10 may be completed in 2-3 weeks under prairie conditions.

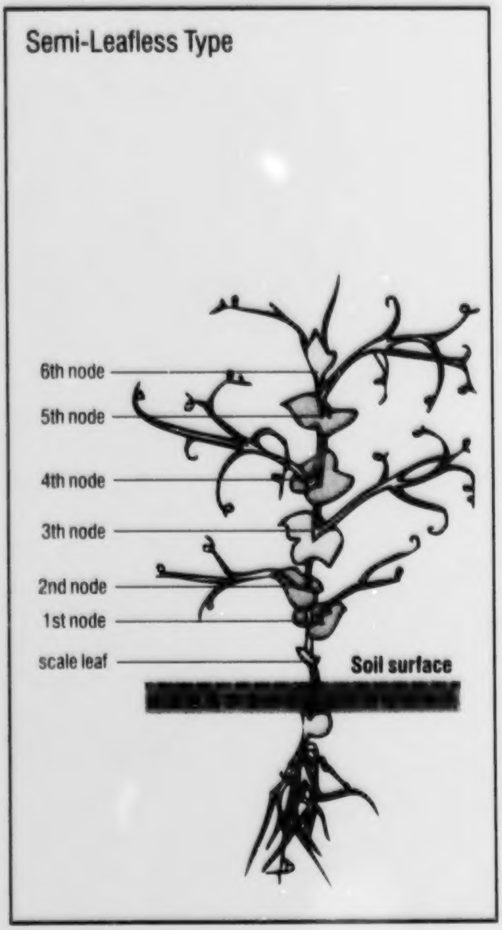
To establish the growth stage of a cereal crop using either of these scales, it is necessary to collect a random sample of plants to determine the level of growth attained by the majority of the plants.

Under good growing conditions, examination of up to 10 random selected plants may be appropriate. Under conditions of uneven germination and low soil moisture, growth stage assessment may require larger samples.

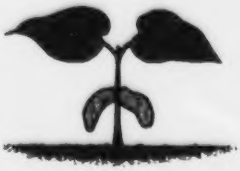
Precise timing of the application of an agrochemical, be it a fungicide, growth regulator, herbicide or supplemental nutrient, is of vital importance in maximizing the desired effect on the target crop. Physiological growth stage, not farming practices based on calendar days, will achieve this desired effect from the agrochemical.

Pea Node (Leaf) Stages

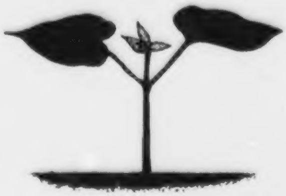

Normal Leaf Type
6th node
5th node
4th node
3th node
2nd node
1st node
Scale leaf
Soil surface


Semi-Leafless Type
6th node
5th node
4th node
3th node
2nd node
1st node
scale leaf
Soil surface

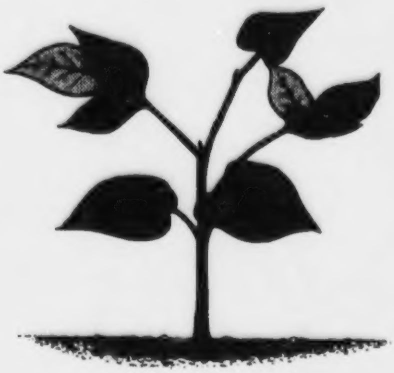
Bean (Leaf) Stages



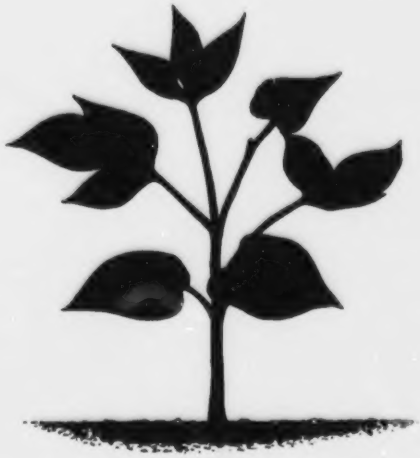
Unifoliate



1st Trifoliate



3rd Trifoliate

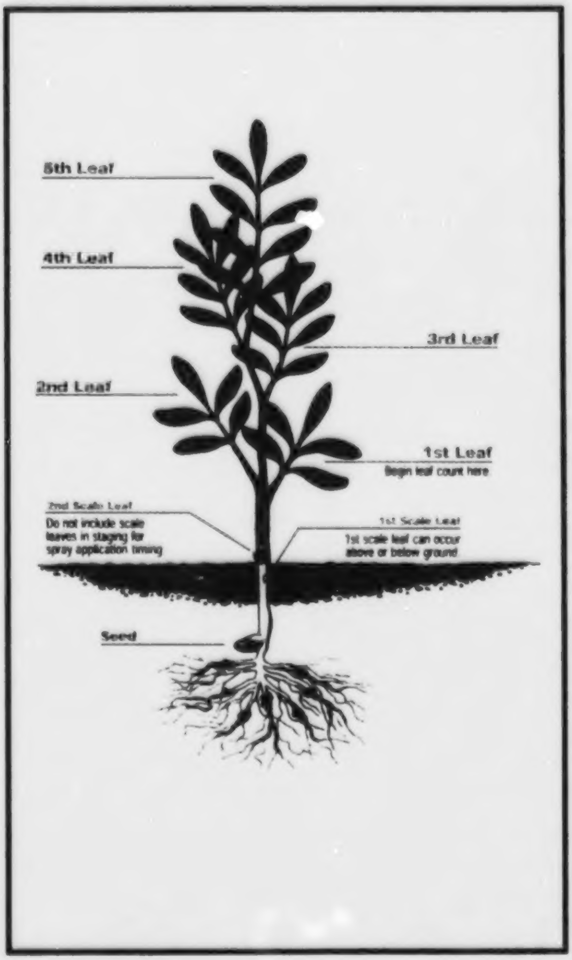


4th Trifoliate

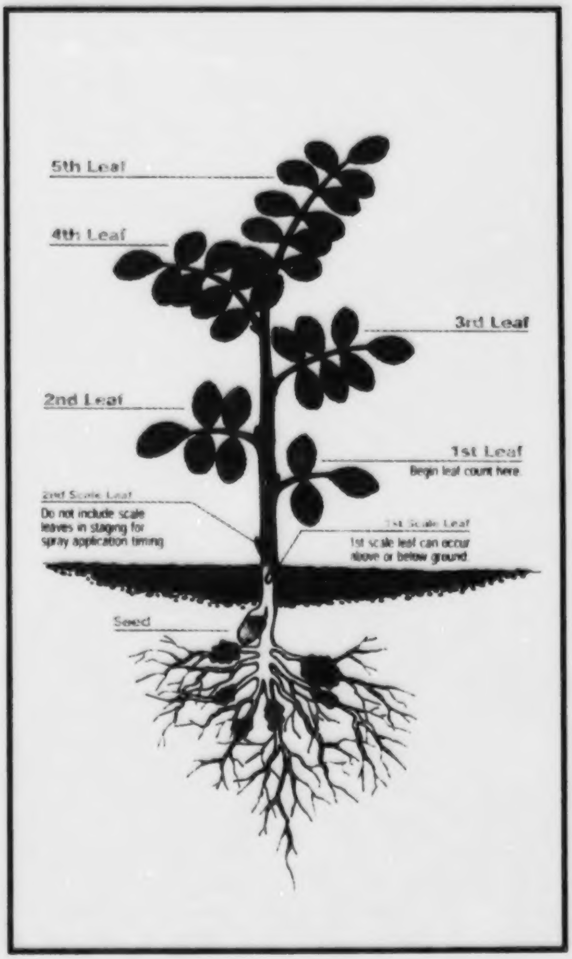
Source: BASF Canada Inc.
Acknowledgement: Technical expertise from Dr. Al Slinkard.

Lentil and Chickpea (Leaf) Stages

Lentil


5th Leaf
4th Leaf
3rd Leaf
2nd Leaf
1st Leaf
Begin leaf count here.
2nd Scale Leaf
Do not include scale leaves in staging for spray application timing
1st Scale Leaf
1st scale leaf can occur above or below ground
Seed

Chickpea


5th Leaf
4th Leaf
3rd Leaf
2nd Leaf
1st Leaf
Begin leaf count here.
2nd Scale Leaf
Do not include scale leaves in staging for spray application timing
1st Scale Leaf
1st scale leaf can occur above or below ground
Seed

Source: BASF Canada Inc.

Acknowledgement: Technical expertise from Dr. Al Slinkard.

How To Use This Book

This publication is intended to be of assistance in the selection and application of pesticides. The pesticides are grouped into four main sections: herbicides, insecticides, fungicides, and rodenticides. Growth regulators are at the end of the herbicide section, and insecticide/fungicide mixes are included in the fungicide section. Each section is indexed separately.

Use the pesticide selector charts at the end of the book and the detailed pesticide descriptions to choose the most appropriate chemicals. To select a suitable pesticide, follow these steps:

- Identify the pest(s).
- Refer to the chart for weed or insect pests, and record the pesticide(s) available.
- Refer to the appropriate pesticide(s) in the text, and select the product best suited to your operation.
- Apply the pesticide strictly according to instructions given on the label attached to the product container.

Chemical Pest Control Summary

Know your problem(s).

- Indentify the pest(s).
- Estimate infestation level or probable economic loss to determine if treatment is required.
- Know the crop variety. Some products are restricted to, or excluded from, use on specific crop types or varieties.
- If necessary, note soil type or texture of the area to be treated.

If chemical control is necessary, choose a pesticide based on the following criteria:

- Registered products for the given crop. (Tank mixes may have separate recommendations.)
- Pests controlled by the product.
- Crop and pest stage of growth or development. Recommended application time (e.g., spring, summer, fall; time of day).
- Cropping and/or harvest restrictions of product(s) considered.
- Use the least toxic suitable product.

Read product label directions for:

- Recommended rate(s) for the particular pest, infestation level, crop and field conditions.
- Method of application.
- Any application restrictions during adverse or extreme weather conditions.
- Any other restrictions, cautions or special instructions.

Clean, prepare, and maintain application equipment.

- Lubricate and repair equipment to get best possible performance.
- Clean spray tank of residues to prevent crop damage or problems with equipment.
- Clean, calibrate and, if necessary, replace spray nozzles.
- Check pump and pressure system.

Safely prepare pesticides for application.

- Use protective clothing and recommended safety equipment, the exposure hazard is greatest during mixing.
- Follow the mixing instructions.
- Use the specified amount and quality of water.
- Use recommended rates (tank mix rates may be different from each pesticide used alone).
- If specified, add adjuvants.
- Record rates used, mix order, pesticides and adjuvants used, and water quality for future reference.

Apply pesticides using:

- Recommended safety precautions and equipment.
- Proper application equipment.
- Recommended rates of pesticides, adjuvants and water.
- Proper time (e.g., growth stage, time of day, season).
- Recommended techniques (e.g., ground speed, pressure, incorporation).
- Record weather conditions at time of application, techniques used, and growth stage of crop and pests for future reference.

Pesticide Resistance

The problem

Agricultural pests can develop resistance to fungicides, herbicides or insecticides. Resistance is the result of repeated use of one or more similar pesticides over a number of years. In Alberta, the potential exists for resistance to develop to a number of products. Producers should follow agronomic practices which both prevent or minimize the development of resistance and prevent the spread of existing resistant populations.

Pest biotypes resistant to one or more chemical pesticides occur naturally. Repeated use of one pesticide or of pesticides with a similar mode of action can result in a buildup of resistance and a loss of control. Pesticide resistant biotypes do not differ in appearance from the susceptible biotypes. Therefore, it is extremely difficult to observe the progression of resistance until a loss of control is observed.

Identifying resistance

- **Loss of control is observed. One pest may escape control while other pest species are controlled.**
- **Was pesticide performance adversely affected by weather conditions or misapplication?**
- **Does the field history indicate repeated use of one or more pesticides with a similar mode of action?**
- **Did the pest infestation occur after pesticide application?**
- **Collect a sample of the pest suspected of being resistant and forward to the Soil and Crop Management branch of Alberta Agriculture, Food and Rural Development.**

Management strategies

Producers should attempt to prevent or delay the appearance of resistance through the rotation of both crops and pesticides.

- **Keep accurate records of crop rotation and pesticide use.**
- **Rotate both crops and pesticides. When rotating pesticides, use products with different modes of action. Avoid repeated use of one or more similar pesticides.**
- **Use clean seed.**
- **Use pest resistant crop varieties.**
- **Use cultural pest controls, including tillage where practical.**
- **Avoid pesticides with long residual activity.**
- **Follow label directions regarding management practices.**
- **Use good sanitation practices. Avoid spreading crop seed, weed seed, crop residues or manure from suspicious fields.**
- **Use mixtures or split applications of pesticides with different modes of action.**
- **Follow all label directions and restrictions carefully.**

Classification of Pesticides

Pesticides can be classified in a number of ways. The two most common are: (1) by family – based on the chemical similarity and (2) by mode of action – the process by which the pesticide kills the pest. In some cases, pesticides from different families have the same mode of action. Repeated use of pesticides with similar modes of action can lead to problems such as the development of pest resistance, increased carryover or possible crop injury. A knowledge of the chemical family can be useful in selecting suitable products in a pesticide rotation to avoid such problems.

In the following classifications, pesticides are divided into families according to similarity in chemical structure. Different formulations of the same pesticides are not separated (e.g., ester or amine). Formulated mixtures containing two or more active ingredients may belong to more than one family and represent more than one mode of action. This must be considered when rotating pesticides to ensure that pesticides with the same mode of action are not used repeatedly on the same field. Pesticide mixtures with different modes of action may delay the development of resistance.

Herbicide Classification

Chemical family	Trade name	Common name
Aryl-oxy-phenoxy	Assure	quizalofop-methyl
	Hoegrass 284	diclofop-methyl
	Horizon	clodinafop-propargyl
	Puma	fenoxaprop-p-ethyl
	Venture	fluazifop-p-butyl
Aliphatic Acid	NATA	sodium-TCA
Amide	Dual	metolachlor
	Kerb 50W	propyzamide
	Stampede EDF	propanil
Amino-propionate	Mataven	flamprop-methyl
Benzoic Acid	Banvel/Dycleer	dicamba
Cyclohexanones	Achieve	tralkoxydim
	Poast	sethoxydim
	Select	clethodim
Dinitroanilines	Edge	ethalfluralin
	Advance 10G, Bonanza, Heritage, Rival, Treflan	trifluralin
Imidazolinones	Arsenal	imazapyr
	Assert	imazamethabenz
	Odyssey	imazamox + imazethapyr
	Pursuit	imazethapyr
Nitriles	Casoran	dichlobenil
	Buctril M/Pardner	bromoxynil
Phenoxys	2,4-D	2,4-D
	SEE 2,4-DB/Embutox/Cobutox 600/Caliber 400	2,4-DB
	Turboprop/Estaprop/Dichlorprop-D	2,4-D + Diclorprop
	MCPA	MCPA
	Tropotox Plus	MCPB + MCPA
	Mecoprop/Compitox	mecoprop
Phosphinic Acid	Liberty	glufosinate
Picolinic Acid	Lontrel, Transline	clopyralid
	Garlon 4	triclopyr
	Tordon	picloram
Bipyridyliums	Gramoxone	paraquat
	Reglone	diquat
Sulfonylurea	Ally, Escort	metsulfuron methyl
	Amber	triasulfuron
	Crossfire, Express	tribenuron methyl
	Muster	ethametsulfuron methyl
	Refine Extra	thifensulfuron methyl + tribenuron methyl
Thiocarbarmates	Avadex BW	triallate
	Eptam/Eradicane 8-E	EPTC
	Sutan$^+$	butylate

Herbicide Classification *(continued)*

Chemical family	Trade name	Common name
Triazines	Atrazine	atrazine
	Bladex	cyanazine
	Crossfire, Lexone/Sencor	metribuzin
	Pronone/Velpar	hexazinone
	Princep Nine-T/Simazine	simazine
Ureas	Afolan F/Linuron 480/Lorox	linuron
	Karmex	diuron
	Patoran	metobromuron
	Spike	tebuthiuron
Uracils	Calmix/Hyvar-X	bromacil
Miscellaneous	Avenge	difenzoquat
	Basagran	bentazon
	Glyfos/Renegade/Roundup/Victor	glyphosate
	Touchdown	glyphosate

Insecticide Classification

Chemical family	Trade name	Common name
Carbamates	Temik	aldicarb
	Sevin	carbaryl
	Furadan	carbofuran
	Lannate	methomyl
	Pirimor	pirimicarb
Organophosphates	APM, Guthion, Sniper	azinphos-methyl
	Diazinon	diazinon
	Cygon, Lagon, Hopper	dimethoate
	Stopper, Dimethoate	
	Dyfonate	fonofos
	Cythion, Malathion	malathion
	Monitor	methamidophos
	Supracide	methidathion
	Dibrom	naled
	Thimet	phorate
	Counter	terbufos
	Dylox	trichlorfon
Organochlorines	Lindane	lindane
	Lorsban, Pyrinex	chlorpyrifos
	Endosulfan, Thiodan	endosulfan
Pyrethroids	Cymbush, Ripcord	cypermethrin
	Decis	deltamethrin
	Ambush, Pounce	permethrin
Phosphides	Gastoxin	aluminum phosphide

Fungicide Classification

Chemical family	Trade name	Common name
Acylalanines	Ridomil	metalaxyl
Aldehydes	Formalin	formaldehyde
Anilides	Vitavax Single Solution	carbathiin
Benzimidazoles	Benlate, Benolin-R	benomyl
	Mertect	thiabendazole
	Easout	thiophanate-methyl
Dicarboximides	Rovral	iprodione
Dithiocarbamates **(Carbamates)**	Dithane M-22, N-M Drill Box, N-M Dual	maneb
	Dithane DG, Manzate 200 Tuberseal, Potato Seed Treatment	mancozeb
	Polyram	metiram
	Tattoo C	propamocarb + chlorothalonil
	Thiram 75 WP/320	thiram
Organochlorines	Lindane	lindane
Phthalimides	Captan FL/50W	captan
Triazoles	Bayleton	triadimefon
	Tilt	propiconazole

M121

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Sprayer Operations

Spraying equipment is described in detail in the *Pesticide Application Equipment,* Agdex 744-5. A summary of sprayer operations is presented in this publication.

Getting the sprayer ready

- Preliminary maintenance, adjustments and settings must be made according to the operator's manual.
- The entire sprayer system should be cleaned and rinsed.
- Ensure that all nozzles are the same size and spray angle by checking the code number on the nozzle tip.
- Partially fill sprayer tank with clean water.
- Check the pump for adequate output. If the desired spraying pressure can be achieved with the agitator and boom valves open, the pump output is okay.
- Check accuracy of main sprayer gauge by installing a new gauge on the boom end temporarily and compare the pressure readings. The readings should be identical.
- Inspect spray patterns and replace tips that have streaky patterns. Flat fan nozzles should be aligned, so the patterns do not interfere with each other.

Note: The video film "Sprayer Calibration" is available from your local District Agriculturist.

Nozzle tip calibration

The output of individual nozzles must be within 5% of the average nozzle output to provide an even volume over the width of the spray swath. Nozzles with outputs either above or below this value must be replaced.

- With the spayer operating at the recommended spraying pressure (275 kPa), collect, measure and record the output from each nozzle on the boom for one minute. **Note:** If nozzle strainers are equipped with ball-check valves, increase pressure by 35 kPa.
- Calculate the average output.
- Replace nozzles with output 5% greater than average. Clean and recheck nozzles with output 5% less than average.

Ground speed determination

Actual ground speed can be confirmed by noting the time it takes to travel a measured distance. The following ground speed chart is based on the time required to travel 800 metres.

Speed (km/h)	Travel time for 800 m (min:sec)
7	6:48
8	6:00
9	5:20
10	4:48
11	4:22
12	4:00

Sample nozzle chart

Nozzle No.	Pressure kPa	Litres per minute	Litres per acre (50 cm spacing) 6 km/h	8 km/h	9 km/h	10 km/h
11001	275	0.38	30	22	20	18
110015	275	0.57	45	34	30	27
11002*	275	0.75	60	45	40	36

*Standard Tips for 40 L/ac at 275 kPa and 9 km/h. For nozzles not included, refer to manufacturer's data or *Pesticide Application Equipment,* Agdex 744-5.

Note: If spray charts are not available for your nozzles, the following formula may be used to establish the ground speed required to apply the desired litres per acre.

Formula:

$$\frac{\text{Average nozzle output (L/min)} \times 240}{\text{Litres per acre} \times \text{nozzle spacing (m)}^*} = \text{km/h}$$

Example:

$$\frac{0.75\ \text{L/min} \times 240}{40\ \text{L/ac} \times 0.5\ \text{m}} = \frac{180}{20} = 9\ \text{km/h}$$

*Standard nozzle spacing is 0.5 m.

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*Standard nozzle spacing is 0.5 m.

Example:

$$\frac{\text{0.75 L/min x 240}}{\text{40 L/ac x 0.5 m}} = \frac{180}{20} = \text{9 km/h}$$

Example of sprayer calibration – L/acre

Step 1: Determine the number of acres to spray using your field records.

Example: *30 acres*

Step 2: Know the sprayer tank capacity, which is marked on sprayer tank.

Example: *2000 litres*

Step 3: Determine spray volume needed per acre, which can be obtained from the pesticide label or this publication.

Example: *40 litres per acre recommended*

Step 4: Select nozzles for 40 litres per acre from the manufacturer's chart or the sample nozzle chart in this publication.

Example: *Nozzle No. 11002 @ 275 kPa and 9 km/h = 40 L/acre*

Step 5: Check nozzle output. See nozzle tip calibration.

Example: *Nozzle flow between 0.71 to 0.79 litres per minute per nozzle is okay*

Step 6: Calculate total spray solution needed by multiplying No. acres x litres/acre.

Example: *30 acres x 40 litres per acre = 1200 litres*

Step 7: Calculate the total amount of pesticide needed from the pesticide label or this publication (multiply litres of pesticide per acre x no. of acres to spray).

Example: *0.60 L/acre x 30 acres = 18 L of pesticide and 1182 L of water in sprayer tank*

Step 8: Set sprayer to travel at desired speed. See step 4 (example) and nozzle chart.

Example: *Required speed = 9 km/h (36 seconds to travel 90 m)*

Standard benchmarks

Application volume:	**40 litres per acre (L/ac) = 100 litres per hectare (L/ha) = 8.8 Imperial gallons per acre**
Spraying pressure:	**275 kilopascals (kPa) = 40 pounds per sq. inch (psi)**
Speed for spraying:	**9 kilometres per hour (km/h) = 5.4 miles per hour (mph)**
Nozzle spacing on spray boom:	**0.5 m = 20 inches (in.)**
Height above target for 80° and 110° nozzle tips:	**45 centimetres (cm) = 18 inches (in.)**
Nozzle tips:	**8002 or 11002**

Note: A standard nozzle puts out 0.75 litres/minute at kPa. At 9 km/h, these nozzles apply 40 L/ac of spray.

Metric equivalents

1 acre	=	0.405 hectare
2.471 acre	=	1 hectare
6.9 kPa	=	1 psi
1.6 km/h	=	1 mph
2.54 cm	=	1 inch
1 litre/ac	=	2.5 L/ha

Calibrating small sprayers

The spray volume that a backpack or hand-held sprayer will apply per acre can be determined by field testing the sprayer on a portion of an acre. The size of the test area commonly used is 1/100 of an acre. It is important that the test area surface is similar to the surface to be sprayed, so the walking speed will remain the same.

Step 1: Establish a test run distance to spray 1/100 acre (40.5 m^2) according to the swath width of the sprayer.

Swath width	Test run length
0.5 metres	81.0 metres
1.0 metres	40.5 metres
1.5 metres	27.0 metres
2.0 metres	20.2 metres

Step 2: At a comfortable walking speed, spray the test area and measure the volume of water used. (Repeat 2 or 3 times to obtain an average). This is the amount applied to 1/100 acre.

Example: *2 L*

Step 3: Multiply the figure arrived at in Step 2 by 100 to get the spray volume per acre.

Example: *2 L x 100 = 200 L/ac*

Step 4: Determine amount of pesticide to add per tank load. Divide the volume applied per acre by tank capacity to determine the number of fills required to spray an acre.

Example: *200 L/ac divided by 20 L/tank = 10 fills*

Divide the chemical rate per acre by the number of tank loads required to spray an acre to determine the amount of product to add per tank load.

Example: *1 L/ac divided by 10 fills = 0.1 L/tank*

Sprayer clean-out

Reasons for sprayer clean-out

- To prevent crop injury by leftover residues.
- To avoid loss of activity of the next pesticide by leftover residues.
- To stop chemicals from corroding or plugging spray equipment.

Clean the sprayer thoroughly when changing chemicals. Clean all parts – sprayer tank, pump, booms, hoses, strainers and nozzles. Plugged nozzle tips should be cleaned with a soft bristle brush or compressed air. **Never use your mouth to blow a tip clean.**

Reduce waste by mixing only the required volume of spray solution and by spraying or reusing as much of the leftover residue as possible. Select a special site for flushing and cleaning of the sprayer. Do not clean sprayers near creeks, dugouts, sloughs, wells or any other water sources. Ensure that wash water does not come into contact with any desirable vegetation or its roots. Make sure discharged wash water (especially from insecticides) will not be accessible to children or animals. Do not contaminate any water course or water body with wash water. **Note:** Pesticides may have specific recommendations for sprayer clean-out. Refer to product labels, on the container, for recommendations.

Cleaning at day's end

- Drain the tank.
- Open boom ends.
- Flush entire system with clean water.
- Remove and clean nozzle tips and strainers as needed.

Cleaning the sprayer when changing chemicals or for sprayer storage

- A more complete cleaning of the sprayer is needed when changing pesticides. Even a small amount of some pesticides left in the sprayer can create serious damage to subsequently sprayed crops.
- Wash outside of sprayer, then drain the tank completely.
- Remove and clean all strainers and nozzle tips. Open boom-ends.
- Partially fill sprayer tank with clean water, circulate and flush through the booms for at least 10 minutes, then drain. If any visible residues remain, repeat clean water rinse cycle.
- Fill sprayer tank with clean water. Add one litre of household ammonia for every 100 litres of water. Re-circulate the solution through the agitator and/or bypass for at least 15 minutes. Spray out and drain completely.
- Repeat the ammonia wash cycle.
- Rinse twice with clean water and drain.

Note: If ammonia is not available, add one of the following alternatives to 100 L of water: 0.5 kg nutrasol or solvental, **or** 1.0 kg trisodium phosphate **or** 0.6 L agral 90. Liquid spray tank cleaner containing potassium hydroxide can also be used.

At end of spraying season

- Add light oil or automobile antifreeze during the final stage of the last rinsing procedure.
- Remove the pump and store it indoors.
- Close all openings into the sprayer to prevent entry of debris or rodents.
- Protect plastic tanks from direct sunlight during storage to ensure longevity.

Preparation and Application of Pesticides

Proper mixing of pesticides

1. Fill the sprayer with half the required amount of clean water.
2. Shake the closed pesticide container vigorously.
3. Slowly add pesticide to sprayer with agitator operating.
4. Add remaining amount of water and spray at once.
5. If tank mixing more than one pesticide, add pesticides to the tank in the order recommended on the label.
6. Triple rinse empty containers and add rinsate to the tank.
7. Always agitate vigorously if sprayer has been standing for a time after mixing.

Adjuvants (surfactants, wetting agents, spreaders, etc.)

Adjuvants are added to a pesticide to enhance application and/or performance. The most common adjuvants used in pesticides are surfactants. If adjuvants are required, use only those products named and recommended on the label. Failure to do so could result in:

- crop injury,
- reduced pest control,
- invalidation of pesticide warranty.

Surfactants facilitate and enhance the emulsifying, dispersing, wetting, spreading, sticking, penetrating or other surface-modifying properties of liquids to bring about enhanced pesticidial action. Because these chemicals produce physical changes at the surface of liquids, surfactants are often referred to as surface-active agents.

Surfactants are generally classified into two major groups based on how they react in water: ionic or non-ionic. Ionic surfactants break down when mixed in water, into two entities – a positively charged ion (cation) and negatively charged ion (anion). An example is ammonium sulphate ($2\ NH_4^+ + SO_4^{-}$).

Non-ionic surfactants do not break down in water. Consequently, they are unaffected by hard water, can be used in strong acid solutions and are more soluble in cold water than in hot water. Some of the commonly recommended non-ionic surfactants for herbicide mixtures are: Agral 90, Ag-Surf, Companion, Citowett Plus, Enhance, Super Spreader-Sticker, Tween 20.

Tank mixtures

Tank mixtures are two or more separate pesticides mixed in the sprayer tank, as opposed to a mixture formulated by the manufacturer. For example, wild oat herbicides are frequently mixed with a broad- leaf herbicide to control a wide range of weeds.

Rate to use in preparing a tank mix

Always check the product labels for the recommended tank mix rates. Generally, add the amount you would use if each pesticide was applied separately but there are exceptions. Generalizations may be dangerous to your wallet and your crop.

Preparing a tank mix

To avoid physical incompatibilities, go through the following steps:

- Add half the required amount of water and mix with one pesticide,
- Agitate,
- With agitator running, add the other pesticide. Add pesticides to the spray tank in the following order to reduce the possibility of formation of precipitates or gums which may clog nozzles and filters:
  - Soluble powders
  - Wettable powders and flowable liquids
  - Solutions (amines and salts)
  - Additives (surfactants)
  - Emulsifiable concentrates (esters)

For specific mixing instructions, always check the product labels as there may be exceptions to these guidelines.

Avoid tank mix problems

Check the labels for recommended crops, pests, and rates for tank mixes as they may be restricted compared to the recommendations for each individual product. For example, either Poast or MCPA amine alone can be used on several crops. A Poast + MCPA amine tank mix can only be used on flax.

Crop injury, reduced pest control, or physical incompatabilities may be the result of using tank mixes improperly. When herbicides for grassy weed control are mixed with herbicides for broadleaf weed control, a partial loss (sometimes total loss) of activity on grassy weed control is quite common. When reduced weed control or crop injury is likely to occur, the advantages of tank mixing are soon lost.

- Tank mix properties are not necessarily the same as those of the individual pesticides applied separately.
- Use registered tank mixes only.
- Check the labels for recommended crops, pests, rates and adjuvants for tank mixing.
- Follow label directions for preparing the mix.
- Use only on crops or varieties registered for the particular tank mix.
- Apply at the recommended stage of growth or development of crop and pest(s).

What to do if results are unsatisfactory

- Ensure the choice of pesticide(s) was suitable. Are the treated crops and pests listed on the product label(s)?
- Compare your method of pesticide preparation to the product label(s) instructions.
- Check for equipment malfunction – e.g., plugged screens, nozzles worn or mixed type or size.
- Compare your application techniques with those given on label(s) – e.g., stage of growth or development of crop and pest(s), ground speed, pressure and incorporation.
- Consider weather conditions at application time – several labels include cautions against application during weather extremes – e.g., cold, heat, drought.
- Consider time since application. Some results are not apparent for several days. Look for early symptoms of the chemical taking effect.
- If results are unsatisfactory, seek technical help. Gather all relevant data, particularly evidence such as photos or specimens. Record wind, rainfall, soil moisture condition, crop variety, fertility, quantity of material used, acres treated and temperature at time of spraying.
- Document everything in writing. If crop damage is involved, submit a specimen for diagnosis. Disease or insect damage can resemble herbicide injury.

Reporting a complaint

Farmers who are present during an application, and have observed that drift of pesticide has occurred on their property should take the following actions to assist in any investigation that may take place at a later date.

- Record as much detail on the application equipment as possible (i.e., color, make, call numbers of aircraft, etc.). If possible, take photographs.
- Write down everything that you can recall of the incident (including time of the occurrence, weather conditions at the time, other people who may have witnessed the incident, other people that the farmer may have talked to about the incident, and their responses, etc.).
- Contact Alberta Environment through the closest regional office at the numbers below, or if after hours, contact the 24 hour emergency number at 1-800-222-6514 or #PERT (#7378) on cellular mobility.

Prairie: Lethbridge	403/381-5511
Bow: Calgary	403/297-8271
Parkland: Red Deer	403/340-5310
Northeast Boreal: Edmonton	780/427-7617
Northeast Slopes: Edson	780/723-8395
Northwest Boreal: Grande Prairie	780/538-5460

Pesticide applicator certificate

Anyone applying pesticides (herbicides, insecticides, fungicides or rodenticides) in exchange for a fee must be certified and hold a Pesticide Service Registration issued by Alberta Environment. If someone is offering to spray your property, ask to see a Pesticide Service Registration and a Pesticide Applicator Certificate (all applicators are issued wallet-sized identification cards).

For questions pertaining to pesticide applicator certification or Service Registrations, please call Alberta Environment at 1-800-661-3495.

Please remember that a certificate is not a guarantee of performance. A certificate only certifies that the certificate holder has met a minimum standard of knowledge – it cannot assess an applicator's integrity or the honesty of his business practices. If you are uncertain about the reliability of a particular applicator, ask for references.

Pesticide user responsibility

Pesticide drift

Pesticide drift is a concern for ground as well as aerial application. Landowners are responsible for ensuring that any pesticide applications conducted on their property are conducted in a safe, responsible manner.

- The choice of chemical should be made with adjacent land uses in mind. If neighbours have livestock, bees, shelterbelts and gardens that may be affected by off-target drift, they should be consulted prior to application. Perhaps a different chemical, formulation or application method will provide the same control and greater compatibility with neighbouring land uses.
- All sprayers (ground or air) should be calibrated prior to use, taking into consideration nozzle type, nozzle pressure and boom height. Calibration will assure better performance as well as reducing the risk of chemical drift. If you are hiring a custom applicator, be sure to ask when the equipment was last calibrated and be sure to check during the application to see whether any visible drift is occuring.
- Buffer strips should be left when applying pesticides next to sensitive crops and farmsteads. The size of these strips will depend on the chemical used, application method and degree of risk from escaping drift. Pesticide applications conducted near rivers, creeks, lakes, irrigation canals or other open bodies of water require extra care and caution to ensure that water users will not be affected by the proposed pesticide application and that the application is conducted in a manner that will not adversely affect aquatic or riparian habitats. Ideally, natural vegetation should be left along natural water bodies to ensure bank stability to provide a natural buffer and filter for agricultural chemicals. A permit must be obtained from Alberta Environment to perform pesticide applications within this thirty metre area.
- Pesticides should not be sprayed when winds are excessive (generally winds over 16 km/hr are considered a drift hazard). Pesticides should only be sprayed when winds are blowing away from farmsteads, sensitive crops or water bodies. Conditions of "dead-calm" or temperature inversions should also be avoided to prevent vapour clouds. A suitable drift retardant additive to the spray tank may help to reduce the potential drift hazard associated with the spraying of pesticides.
- Always assess the risk to adjacent landowners and never push weather conditions to meet deadlines. If completing an application as planned may mean damaging your neighbour's property, postpone the application or modify it to prevent off-target damage.
  Landowners can be held liable for pesticide drift even if a custom applicator was hired to perform the application. When you hire a custom applicator, it is important that you hire a company that is registered, operates with certified applicators, and has knowledge, equipment, experience and desire to perform an application properly. Custom applicators must be aware of neighbouring residences and sensitive crops, (including gardens, livestock, bees, shelterbelts and gardens) which could present problems if drift should occur.

- All pesticide users, commercial pesticide applicators and farmers are legally responsible for safe pesticide use. Farmers who cause damage from their pesticide application activities, or who counsel a commercial pesticide service to conduct either an illegal pesticide application or an application under questionable circumstances (e.g., extremely windy conditions) that results in damage, can be held liable for compensation and face potential prosecution. **Farmers are cautioned** not to counsel commercial applicators to apply pesticides not registered for the use intended, or to direct applications to occur under known circumstances that could cause damage (such as under windy conditions). Results of such actions could cost you time and money by having to appear in court to answer to charges or through the subsequent remediation of damaged crops, shelterbelts, gardens, etc.

Notification of neighbours before applying pesticides

- Notifying your neighbours before you or a custom application service begins spraying for you is **not** a legislated requirement; however, it is **strongly recommended and good practice,** particularly if your fields border your neighbours farmstead or other sensitive areas (e.g., where beehives, gardens or shelterbelts may be located). Many potentially harmful situations may be avoided if you talk to your neighbour and advise what and when you anticipate spraying. Let them know whether you will be spraying by ground or by air (noise from low flying aircraft has been known to cause panic in livestock), and ask if your neighbour is planning any events (e.g., family reunions/picnics) where larger numbers of people may be gathered and could potentially be exposed to pesticides from your application. By notifying your neighbours, you are not seeking their consent, but rather letting them know you are concerned about them and their property and want them to be able to take whatever action they believe is necessary before spraying to reduce the potential exposure to the pesticide.

Disposal of pesticide treated seed

Seed treated with a fungicide, fungicide mixture or fungicide/insecticide combination can be very toxic and should be treated with respect. A blue or red coloration on seed indicates that it is pesticide- treated. Extra care must be taken during the transport and disposal of pesticide treated seed to prevent domestic animals, birds and other wildlife from consuming the treated seed.

Treated seed is very hazardous to birds. Any left lying on the ground can be eaten by birds, killing them. Be sure treated seed is properly seeded and never leave surplus seed unburied. Spills of treated seed, such as from trucks lurching, can be enough to kill deer or cattle. Treated seed blowing off along the road can kill many birds.

Cover granular pesticides with the soil immediately after application to prevent birds and other wildlife from being able to consume it.

Spillage: Move treated seed, particularly insecticide treated seed, in labelled marked bags. Open container transport is not recommended. Bags should be checked for damage and containers should be sealed or lined with plastic or other suitable material. Truck loads of seed should be tarped down securely to avoid any possible highway spillage. All treated seed and seed treatment residue should be placed into the seeder at planting time – never dumped in a field.

Disposal: Normally, treated seed is planted within one or two years of treatment. If there is treated seed, either bagged or loose that is either considered too old or too low in germination, then consider its disposal. Such treated seed should be mixed with new seed and planted at higher rates or seeded by itself. For example "old canola seed" can be mixed and sown with new canola seed or overseed alone along field margins or low areas. If disposal is necessary, check with your local landfill authority before disposing in a sanitary landfill. Ensure that the treated seed is covered immediately after dumping.

Pesticide disposal

Unwanted or out-of-date pesticides should be disposed of very safely and responsibly. Pesticides are hazardous wastes and cannot be disposed of in sanitary landfills or by burning. If you will not be able to use pesticide supplies, check to see whether a neighbour may have some use for them. Pesticides that have no further use must be disposed of through a qualified (approved) hazardous waste disposal firm. Names of companies that are licenced to handle hazardous waste can be obtained by contacting Alberta Environment's Recycle Information Line at 1-800-463-6326.

Water protection

- The preservation of water quality is critical to our sustained quality of life and agricultural production:
- Pesticides must **not** be stored, mixed or equipment cleaned within 30 metres of an open body of water.
- Pesticides subject to leaching should not be used on soils with a high leaching potential to prevent groundwater contamination. Pesticide leaching characteristics and soil leaching potentials are available from Agriculture and Agri-Food Canada.
- Never store pesticides in well houses.
- Haul water to your sprayer and fill it in the field rather than taking the sprayer near the water source.
- Do not leave sprayers unattended while filling.

Pesticide container disposal

Triple rinsing or pressure rinsing of pesticide containers is the recommended method of cleaning pesticide containers prior to disposal. Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99 per cent free (less than 1 ppm) of residues in most cases. There are a number of systems for pressure rinsing. The simpler style consists of a hollow spike connected to a water line, which injects water under pressure into the jug, which is then drained into the spray tank. A newer style consists of a small hopper mounted right on the sprayer with a sharp metal jug opener and a pressure rinse nozzle in the bottom of the hopper. The full jug is inserted on the jug opener, which drains the chemical into the tank. Wash water is injected under pressure to rinse the container. The chemical and rinse solution is then pumped into the spray tank by direct hose connections.

Unrinsed containers have the potential to contaminate soil, ground water and surface water, and can be toxic to fish and wildlife. Unrinsed containers impede the processing and recycling of empty pesticide containers, as containers have to be emptied, and workers are exposed to the residue. Residues can be transported to the atmosphere during storage, processing, shipping and energy recovery, or can contaminate end products from plastic recycling processes. In addition, it is estimated that 6 - 7% of product can be left in unrinsed containers. This amount of material can treat 1/2 to 1 acre of land and can result in several dollars of savings.

Containers disposed of at a container collection site are to be clean (triple rinsed or pressure rinsed) and well-drained (dry). Paper bags and cardboard containers should be thoroughly emptied and disposed of at a sanitary landfill. **Do not burn paper bags or cardboard containers.** Outer packaging (cardboard box) can be disposed of in a regular landfill. Some pesticide container sites have bins or separate areas for collecting outer packaging materials. Under the Alberta Environment and Enhancement Act, non-refillable plastic or metal pesticide containers (restricted, agricultural and industrial products) must be disposed of at a pesticide container collection site.

Steps to follow for manual triple rinsing (without using a pressure rinse system):

- Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
- Add water to container to about 1/5 full.
- Shake the container thoroughly and empty into the spray tank, and drain for 30 seconds.
- Repeat the procedure two more times; it should only take about 5 minutes in total.
- Triple rinsed containers should be punctured or broken to render them non-reusable. Punctured containers also identify themselves as being triple rinsed. **Note:** Do not puncture unrinsed containers-pesticide from unrinsed containers is concentrated material and puncturing unrinsed containers will cause them to leak and create exposure of the concentrated material to the environment and to persons handling the containers.
- Dispose of all plastic and metal containers at a pesticide container collection site (see list).

Pesticide spill cleanup

In the event of a pesticide spill, follow the steps listed below:

- Isolate affected area
- Put on protective clothing and equipment.
- Ventilate the area (if indoors). For outdoor spills, work from the upwind side of the spill.
- If possible, stop the containers from further leaking.
- Contain the spread of the spill using soil, sand bags, vermiculite, kitty litter, etc to provide a barrier to the spread of the spill. Prevent pesticide entry into sewers or water supply.
- Clean up the spilled pesticide. Absorb spill on paper, sand, dirt or other inert material (e.g., kitty litter). Wash site with detergent or other cleaning products such as ammonia. Check the product label or contact the manufacturer for advice on cleanup procedures (most products have a 1-800 customer service number on the label). Dispose of all absorbant materials in an approved landfill. If the spill is large, evacuate the area and notify safety personnel.

Contact Alberta Environment, Environmental Services for more information: Grande Prairie (780) 538-5460; Edson (780) 723-8395; Edmonton (780) 427-7617; Red Deer (403) 340-5310; Calgary (403) 297-8271; Lethbridge (403) 381-5511. Emergencies or spills can be reported to the 24 hr. environmental emergency/complaint telephone number: 1-800-222-6514.

Pesticide Container Site Locations

Municipality	Site	Legal Land Location	Contact
Acadia #34, MD of	Acadia Valley Landfill	NW7-25-1-W4	Gary Peers (403) (972-3755)
Athabasca #12, County of	Colinton Landfill	NE7-65-22-W4	Ron Jackson (780) (675-2273)
Barrhead #11, County of	Barrhead Landfill	SW3-60-4-W5	Marilyn Flock (780) (674-3331)
Beaver County	Ryley Regional Landfill	NE10-50-17-W4	Martin Baert (780) (663-3730)
Beaver County	Viking Waste Transfer Station	NE31-47-12-W4	Martin Baert (780) (663-3730)
Big Lakes, MD of	High Prairie Regional Landfill	NW9-73-15-W5	Gary Braithwaite (780) (523-6570)
Birch Hills County	Peoria Landfill	NW3-77-2-W6	Dean Cooper (780) (694-3793)
Birch Hills County	Tangent Landfill	NE36-78-25-W5	Dean Cooper (780) (694-3793)
Bonnyville #87, MD of	Bonnyville Seed Cleaning Plant	NW18-61-5-W4	George Vachon (780) (826-3951)
Bonnyville #87, MD of	Goodridge Landfill	SW4-63-9-W4	George Vachon (780) (826-3951)
Brazeau #77, MD of	Drayton Valley Brazeau Reg. Landfill	SE20-49-7-W5	Rola Hogan (780) (542-7777)
Calgary, City of	Calgary - Forest Lawn Landfill (Includes MD #44)	3801-68 St. S.E. Calgary	Jasna Hundel (403) (230-6617)
Camrose #22, County of	Camrose Regional Landfill	NE16-46-20-W4	Paul King (780) (672-4765)
Camrose #22, County of	Ferintosh - West Dried Meat Lake Landfill Auth.	SW14-44-21-W4	Paul King (780) (672-4765)
Cardston #6, MD of	Spring Coulee Waste Transfer Station	SW32-4-23-W4	Bryan Phillips (403) (653-4977)
Clear Hills #21, MD of	Worsley Landfill	SE25-87-8-W6	Marilyn Ray (780) (685-3925)
Clearwater #99, MD of	Rocky Mountain House Waste Transfer Station	SE2-39-5-W5	Kim Nielsen (403) (845-4444)
Cypress County	Irvine Landfill	NE31-11-2-W4	Doug Henderson (403) (526-2888)
Cypress County	Medicine Hat Lakeside Milling	NE21-12-6-W4	Doug Henderson (403) (526-2888)
Drumheller, Town of	Drumheller & District Solid Waste Mgmt. Assoc.	NE36-28-20-W4	R.M. Romanetz (403) (832-6300)
Edmonton, City of	Edmonton - Clover Bar Landfill	SW28-53-23-W4	Randy Clark (780) (496-6681)
East Peace #131, MD of	Nampa Landfill	E19-81-20-W5	Audrey Gall (780) (322-3831)
East Peace #131, MD of	St. Isidore Landfill	SW2-84-20-W5	Audrey Gall (780) (322-3831)
Fairview #136, MD of	Fairview Landfill	SW27-82-3-W6	Mike Seabrook (780) (835-4903)
Flagstaff County	Sedgewick - Flagstaff Reg. Landfill	SW11-45-12-W4	Bill Parker (780) (384-3950)
Foothills #31, MD of	Okotoks - Foothills Reg. Landfill	SE32-19-29-W4	Mark Stewart (403) (652-2341)
Forty Mile #8, County of	Bow Island Landfill	SE23-11-11-W4	John Hood (403) (867-3530)
Forty Mile #8, County of	Foremost Landfill	NW19-6-11-W4	John Hood (403) (867-3530)
Grande Prairie #1, County of	Clairmont Landfill	NW27-72-6-W6	Tarolynn Aaserud (780) (532-9722)
Greenview #16, MD of	Valleyview - MD Yard	NW10-70-22-W5	Normand Boulet (780) (524-4445)
Kneehill County	Three Hills Waste Transfer Station	SW25-31-24-W4	Bruce Sommerville (403) (443-5541)
Lac Ste. Anne County	Gunn - Lac Ste. Anne Reg. Landfill	NE18-55-3-W5	Allan Deutsch (780) (785-3411)

Municipality	**Site**	**Legal Land Location**	**Contact**
Lacombe County	Eckville Waste Transfer Station	NW34-39-3 W5	Keith Boras (403) (782-6601)
Lacombe County	Mirror-Alix Waste Transfer Station	NW24-40-23-W4	Keith Boras (403) (782-6601)
Lacombe County	Prentiss Waste Transfer Station	NW7-40-25-W4	Keith Boras (403) (782-6601)
Lakeland County	Lac La Biche - County Yard	SE5-67-13-W4	Greg Ibach (780) (623-4468)
Lamont #30, County of	Lamont Regional Landfill	NW7-56-18-W4	Greg Paranich (780) (895-2585)
Leduc County	Nisku Sewage Transfer Station	SW31-50-24-W4	Rick Thomas (780) (955-3555)
Leduc County	Thorsby - County Yard	SE17-49-1-W5	Rick Thomas (780) (955-3555)
Lesser Slave River #124, MD of	Flatbush Waste Transfer Station	NW36-65-2-W5	Russ Jassman (780) (681-3929)
Lethbridge #26, County of	Coaldale Waste Transfer Station	SW23-9-20-W4	John Vanden Broeke (403) (328-5525)
Lethbridge #26, County of	Iron Springs Waste Transfer Station	SW27-11-20-W4	John Vanden Broeke (403) (328-5525)
Lethbridge #26, County of	Nobleford Waste Transfer Station	SE10-11-23-W4	John Vanden Broeke (403) (328-5525)
Lethbridge #26, County of	Picture Butte Waste Transfer Station	NW27-10-21-W4	John Vanden Broeke (403) (328-5525)
MacKenzie #23, MD of	High Level Regional Landfill	SE1-110-20-W5	Chris Kelland (780) (927-3719)
Minburn #27, County of	Mannville Landfill	SW16-50-9-W4	Darwin Ullery (780) (632-4033)
Minburn #27, County of	Vegreville Landfill	NW21-52-14-W4	Darwin Ullery (780) (632-4033)
Mountain View County	Didsbury (near airport)	SW5-32-1-W5	Larry Rice (403) (335-3311)
Newell #4, County of	Brooks	SE28-17-14-W4	Steve Wylie (403) (362-2722)
Northern Lights #22, MD of	Dixonville - Long Lake Reg. Landfill	NW3-86-24-W5	Terry Schamehorn (780) (836-3348)
Paintearth #18, County of	Castor Landfill	SW3-38-14-W4	Michelle Buchwitz (403) (882-3211)
Paintearth #18, County of	Coronation Landfill	NW34-36-11-W4	Michelle Buchwitz (403) (882-3211)
Parkland County	Stony Plain Landfill	SE35-52-1-W5	Mark Cardinal (780) (963-2231)
Parkland County	Tomahawk - County Yard	SW13-51-5-W5	Mark Cardinal (780) (963-2231)
Peace #135, MD of	Griffin Creek Landfill	SW18-81-25-W5	Joyce Sydnes (780) (338-3845)
Pincher Creek #9, MD of	Cowley (Regional Landfill)	NW8-7-1-W5	Alan Jacklin (403) (627-3130)
Pincher Creek #9, MD of	Pincher Station	SW1-7-30-W4	Alan Jacklin (403) (627-3130)
Ponoka County	Bluffton Landfill	NW6-44-2-W5	Robert Zimmer (403) (783-3333)
Ponoka County	Ponoka Waste Transfer Station	NE36-42-25-W4	Robert Zimmer (403) (783-3333)
Provost #52, MD of	Provost Regional Landfill	SW3-40-3-W4	Burt Forbes (780) (753-2368)
Red Deer County	Pine Lake Regional Landfill	NW10-37-25-W4	James Squire (403) (350-2150)
Rocky View #44, MD of	Forest Lawn Landfill (City of Calgary)	3801-68 St. S.E. Calgary	Tim Dietzler (403) (230-1401)
Saddle Hills County	Gordondale Landfill	SE25-79-11-W6	John Knoot (780) (864-3760)
Smoky Lake County	Smoky Lake Landfill	NW2-60-17-W4	Jeff Warwa (780) (656-3730)
Smoky River #130, MD of	Falher Landfill	NW15-78-21-W5	Shaleen Gerbig (780) (837-2222)
Special Area #2	Bindloss Waste Transfer Station	SE24-22-3-W4	George Aaserud (403) (854-5627)
Special Area #2	Hanna Waste Transfer Station	NW16-31-14-W4	George Aaserud (403) (854-5627)

Municipality	Site	Legal Land Location	Contact
Special Area #3	Oyen Waste Transfer Station	LSD3-27-27-4-W4	Bill Kolkman (403) (664-3618)
Special Area #3	Youngstown - Big Country Regional Landfill	SE29-29-9-W4	Bill Kolkman (403) (664-3618)
Special Area #4	Monitor Waste Transfer Station	NW32-34-4-W4	Jordan Christenson (403) (577-3523)
Spirit River #133, MD of	Md of Spirit River Landfill	SW31-77-5-W6	Julie Shaw (780) (864-3500)
St. Paul #19, County of	Mallaig Landfill	NE24-60-10-W4	Dennis Bergheim (780) (645-3301)
St. Paul #19, County of	St. Paul Seed Cleaning Plant	SE16-58-9-W4	Dennis Bergheim (780) (645-3301)
Starland County	Rumsey Waste Transfer Station	SW24-33-21-W4	Alan Hampton (403) (772-3793)
Starland County	Michichi Waste Transfer Station	NW19-30-18-W4	Alan Hampton (403) (772-3793)
Stettler #6, County of	Stettler Regional Landfill	NW22-40-19-W4	Walt Saar (403) (742-4441)
Strathcona County	Fort Saskatchewan Recycling Station	11121-88 Ave., Ft. Sask.	Kevin Glebe (780) (417-7130)
Sturgeon County	Sturgeon Regional Landfill	SW36-55-25-W4	Deb Harvie (780) (939-5678)
Taber, MD of	Enchant Landfill	NW16-14-18-W4	Dick Layton (403) (223-8735)
Taber, MD of	Grassy Lake Waste Transfer Station	NW23-9-13-W4	Dick Layton (403) (223-8735)
Taber, MD of	Vauxhall Landfill	SW12-13-16-W4	Dick Layton (403) (223-8735)
Thorhild #7, County of	Thorhild	NE5-60-21-W4	Cindy Olchowy (780) (398-3741)
Two Hills #21, County of	Two Hills Regional Landfill	NE5-55-11-W4	John Bidulock (780) (657-3358)
Two Hills #21, County of	Willingdon Seed Cleaning Plant	NE1-56-15-W4	John Bidulock (780) (657-3358)
Vermilion River #24, County of	Marwayne Waste Transfer Station	SE34-52-3-W4	Dion Burlock (780) (846-2244)
Vermilion River #24, County of	Kitscoty County Yard	NE35-51-3-W4	Dion Burlock (780) (846-2244)
Vermilion River #24, County of	Vermilion Landfill	SW5-51-6-W4	Dion Burlock (780) (846-2244)
Vulcan County	Vulcan Waste Transfer Station	SW4-17-24-W4	Kelly Malmberg (403) (485-2241)
Wainwright #61, MD of	Wainwright Crop Tech Agro	SW28-44-6-W4	James Schwindt (403) (842-4454)
Warner #5, County of	Border Seed Cleaning Plant	SW29-2-14-W4	Jamie Meeks (403) (642-3636)
Warner #5, County of	Sunshine Seed Cleaning Plant	NW12-6-19-W4	Jamie Meeks (403) (642-3636)
Westlock County	Vimy Landfill	SW3-59-24-W4	Dennis Mueller (780) (349-3346)
Wetaskiwin #10, County of	Peace Hills Transfer Station	SW29-46-24-W4	Steve Majek (780) (352-3321)
Wheatland County	Hussar Waste Transfer Station	NW1-24-20-W4	James Laslo (403) (934-3321)
Wheatland County	Standard Waste Transfer Station	SW10-25-22-W4	James Laslo (403) (934-3321)
Wheatland County	Strathmore Waste Transfer Station	NE34-23-25-W4	James Laslo (403) (934-3321)
Willow Creek #26, MD of	Claresholm Landfill	SE21-12-27-W4	Neil McLean (403) (625-3351)
Willow Creek #26, MD of	Fort MacLeod Waste Transfer Station	SE7-9-25-W4	Neil McLean (403) (625-3351)
Woodlands County	Fort Assiniboine - MD Yard	SW2-62-6-W5	Dale Kluin (780) (584-3866)
Yellowhead County	Evansburg	Contact Ag. Fieldman	Daryl Switzer (780) (325-3782)

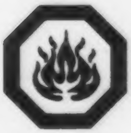
Note: Some municipalities have other temporary sites for dropping off empty pesticide containers. Phone municipal contact for locations and operating hours.

Safety Precautions

Warning symbols

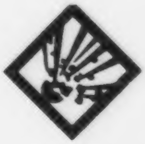
Visual warning symbols on pesticide labels indicate the kind of harm that can result from pesticide misuse or mishandling. They alert the user to the degree of the hazard (by the shape of the border) and to the type of hazard (by the centre "picture").

Flammable



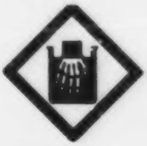
The "fire" symbol is a warning that the pesticide is flammable or easily ignited. Keep the pesticide away from heat, sparks or open flames. Do not smoke while mixing or applying the product.

Explosive



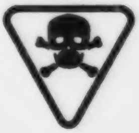
The "exploding grenade" symbol indicates that the pesticide can explode, e.g., pesticide in pressurized cans. Explosive conditions may also be created by using Roundup or Rustler (glyphosate) in a galvanized steel spray tank.

Corrosive



The "corroded hand" symbol indicates that the pesticide is corrosive to the skin and eyes. The chemical is either acid or alkali (caustic) and can burn the skin. Protect the skin and eyes when using these products.

Poisonous



The "skull and crossbones" symbol warns that the chemical is poisonous if taken into the body. Keep the product out of reach of children. Use the appropriate safety measures when dealing with poisonous products.

Pesticide toxicity, hazard and risk

The terms "toxicity," "hazard" and "risk" do not all have the same meanings. Users of pesticides should understand the difference in meanings among these terms.

Pesticides vary in **toxicity** or the degree of being poisonous. How poisonous a pesticide is depends on its inherent chemical and physical properties.

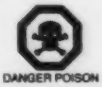
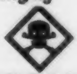
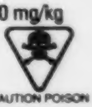
The relative **hazard** of a pesticide depends on the toxicity of the pesticide, the dose received and the length of time exposed. No hazard exists when the pesticide container is sealed, but once the seal is broken and the pesticide is handled, exposure can occur and a hazardous situation is created.

Risk of exposure is a function of how an individual handles the product. Although the hazard may be the same whenever a pesticide is being poured into the spray tank, the risk is different if one person wears a hard hat, goggles, respirator, nitrile gloves, waterproof apron and neoprene or rubber boots and the other person wears none of these. A knowledge of the toxicity of a product and the potential for personal exposure can be used to lower the risk of exposure. The user can control the risk by carefully managing the hazard. Even when highly toxic pesticides are used, if the degree of exposure is kept low enough, the risk can be kept at an acceptable level. The toxicity of the pesticide can't be changed, but the risk can be managed.

LD_{50} values are used to rate the toxicity of the pesticides. The LD_{50} is an abbreviation for the dose (expressed in milligrams per kilogram of body weight of the test animal) that is lethal to 50 per cent of the group of test animals. For example, if a pesticide has an oral LD_{50} value of 10 mg/kg, and the test animals each weigh 1 kg, 50 per cent of the animals would die of poisoning if each ate 10 mg of the pesticide.

The smaller the LD_{50} value, the more toxic the pesticide. The LD_{50} value usually refers to the active ingredient in the pesticide formulation. In this publication, the LD_{50} of the formulated product is also given when available.

The following table relates the oral LD_{50} value (mg/kg) of a pesticide to its toxicity symbol.

LD_{50} less than 500 mg/kg indicates high toxicity	 DANGER POISON	LD_{50} 500-1,000 mg/kg indicates moderate toxicity	 WARNING POISON
LD_{50} 1,000-2,500 mg/kg indicates low toxicity	 CAUTION POISON	LD_{50} greater than 2,500 mg/kg indicates very low toxicity	

M121

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THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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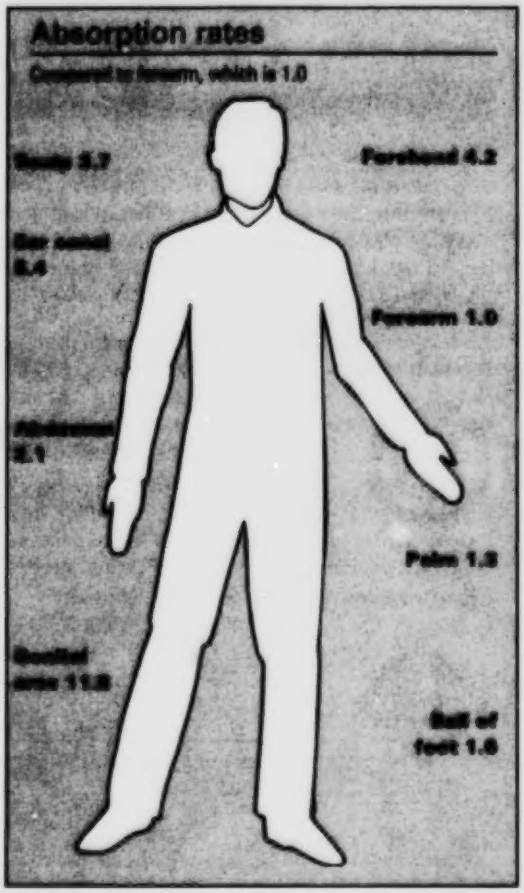
Symptoms of Poisoning

[illegible]

Reducing the risk of exposure to pesticides

Pesticides may enter the body through the skin (dermally), the mouth (orally) or the nose (inhalation).

Skin
Absorption through the skin is the most common route of exposure. Different areas of the body absorb pesticides at different rates. For example, assuming that the forearm is given an absorption rate of 1.0, the relative absorption rate of pesticides in the ear canal is 5.4, on the scalp 3.7, on the forehead 4.2 and the genital area 11.8 – almost 12 times greater than the forearm. The genital area and the head are the areas where absorption is the greatest.


Absorption rates

Compared to forearm, which is 1.0

Reducing the risk of exposure through the skin is possible through the careful selection, use and care of protective clothing and safety equipment. Protective clothing and equipment can provide a barrier that reduces contact between the skin and pesticides. See section on *Protective Clothing and Equipment* for recommended wear. To help reduce pesticide buildup, clothing should be washed daily, using recommended procedures; see *Cleaning of Clothes and Equipment*.

How skin is exposed to pesticides:

- Direct handling of pesticides: This includes any activity where the pesticide could come into direct contact with the skin, from spills and splashes during mixing and handling of the concentrated pesticide, during equipment adjustment and from spray drift during application. The greatest risk occurs when the chemical concentrate is being handled; extra protection should be used at that time. The use of a waterproof apron is highly recommended when handling all pesticide concentrates, regardless of toxicity.

- Transfer from contaminated clothing or equipment: Clothing worn during pesticide use should be restricted to that use only, thereby eliminating the possibility of continued dermal exposure due to pesticide residues remaining in the clothing. Some types of concentrated pesticides are not removed after multiple washings. Clothing contaminated by accidental spills of concentrated pesticide should be discarded rather than laundered. Avoid entering the house wearing contaminated clothing and equipment. Pesticides may be transferred from boots to floors and carpets where children and pets may be exposed.
- Transfer to other clothing during washing: Always store and wash pesticide-contaminated clothing separately from the rest of the family wash as pesticides can be transferred to other clothing during the laundering process.

Even pesticides not absorbed by the skin may still cause skin problems such as redness, blisters or dry scaliness, which may lead to serious skin eczema and dermatitis. Good personal hygiene is important to help minimize pesticide absorption through the skin. Shower, shampoo your hair and put on clean clothing immediately after you finish using pesticides for the day or after an accidental spill. Cuts and scrapes should be cleaned and bandages changed after handling pesticide to avoid possible dermal absorption from contaminated bandages.

Eyes

Eyes are very sensitive to pesticides. They can be exposed to vapor or fumes, dust, spray drift, or accidental spills and splashes when containers of liquid concentrates are being opened or when the concentrated chemical is being poured into the sprayer tank. Do not wear contact lenses when mixing or applying pesticides.

Ears

Sprays and spills may contaminate the head and ear canal.

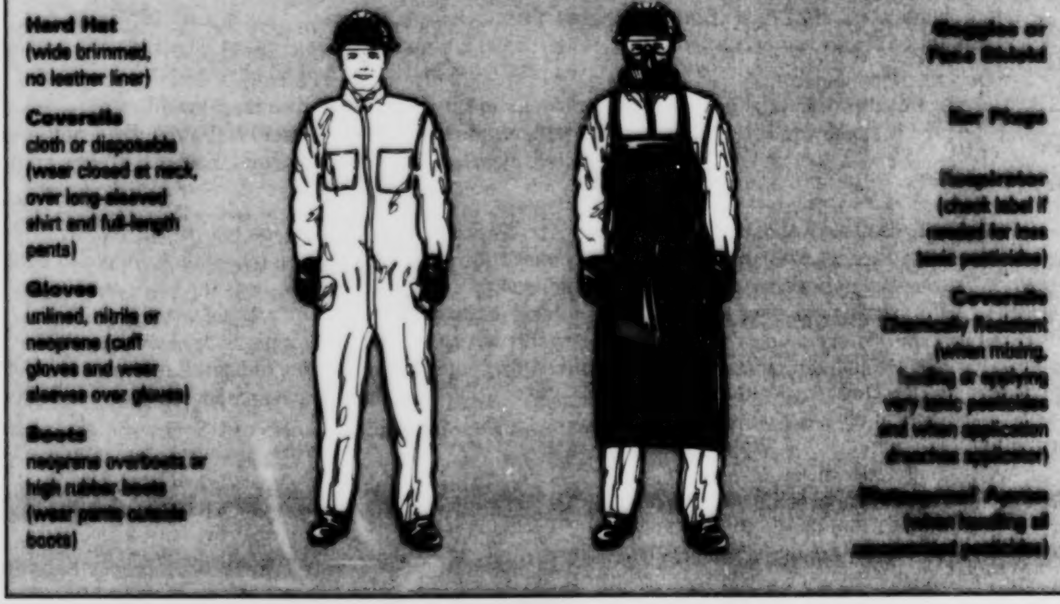
Protective clothing and equipment

Minimum protection

This is the minimum level of protection required when working with dilute, less toxic or granular pesticides. Where there is direct contact with the pesticide, add extra protection.

Extra protection

Extra protection is required for mixing, loading and handling pesticide concentrates, especially when working with highly toxic pesticides. Check pesticide label.


Hard Hat
(wide brimmed,
no leather liner)
Coveralls
cloth or disposable
(wear closed at neck,
over long-sleeved
shirt and full-length
pants)
Gloves
unlined, nitrile or
neoprene (cuff
gloves and wear
sleeves over gloves)
Boots
neoprene overboots or
high rubber boots
(wear pants outside
boots)
Goggles or
Face Shield
Ear Plugs
Respirator
(check label if
needed for less
toxic pesticides)
Coveralls
Chemically Resistant
(when mixing,
loading or applying
very toxic pesticides
and when application
drenches applicator)
Waterproof Apron
(when loading all
concentrated pesticides)

Symptoms of Poisoning

Pesticide poisoning can be acute (due to an accident) or chronic (due to continued exposure over a long period). For example, chronic health problems may develop after long term exposure to pesticides low in toxicity. Accidental contact with a pesticide, however, will not necessarily lead to poisoning. Both types of poisoning can exhibit mild, moderate or severe symptoms as follows:

Mild poisoning symptoms: Mild symptoms may be vague and can be compared with a sickness such as influenza. Typical symptoms include nausea, headache, tightness of chest, loss of appetite and stomach cramps. These symptoms can be immediate or be delayed by 12 - 24 hours.

Moderate poisoning symptoms: These symptoms are usually more pronounced than mild symptoms. They include nausea, trembling, muscular incoordination, excessive saliva, blurring of vision, tightness of chest, difficulty in breathing, flushed or yellow skin, abdominal cramps, vomiting, diarrhea, tearing from eyes, profound weakness, rapid pulse and cough.

Severe poisoning symptoms: Severe symptoms are often more specific and require immediate hospital treatment. They include vomiting, diarrhea, excessive sweating, inability to breathe, convulsions, fever, intense thirst and coma.
It is imperative to reduce exposure when using all pesticides whether they are highly toxic or have very low toxicities.

Reducing the risk of exposure to pesticides

Pesticides may enter the body through the skin (dermally), the mouth (orally) or the nose (inhalation).

Skin

Absorption through the skin is the most common route of exposure. Different areas of the body absorb pesticides at different rates. For example, assuming that the forearm is given an absorption rate of 1.0, the relative absorption rate of pesticides in the ear canal is 5.4, on the scalp 3.7, on the forehead 4.2 and the genital area 11.8 – almost 12 times greater than the forearm. The genital area and the head are the areas where absorption is the greatest.

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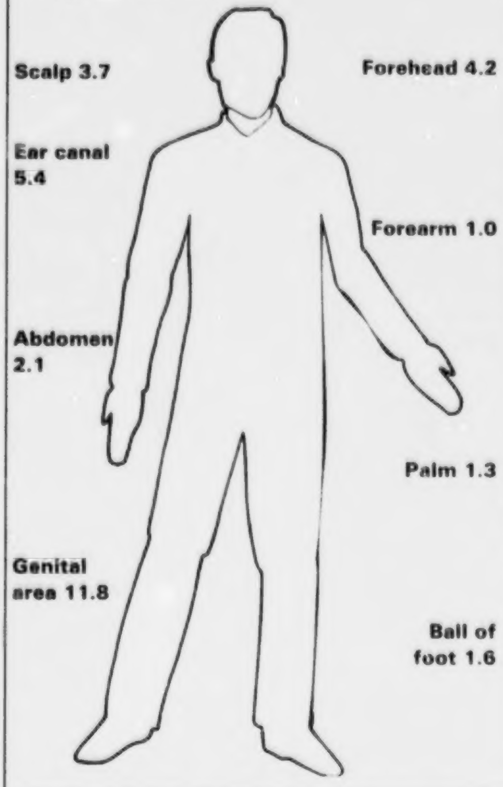
Compared to forearm, which is 1.0



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How skin is exposed to pesticides:

- Direct handling of pesticides: This includes any activity where the pesticide could come into direct contact with the skin, from spills and splashes during mixing and handling of the concentrated pesticide, during equipment adjustment and from spray drift during application. The greatest risk occurs when the chemical concentrate is being handled; extra protection should be used at that time. The use of a waterproof apron is highly recommended when handling all pesticide concentrates, regardless of toxicity.

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Eyes

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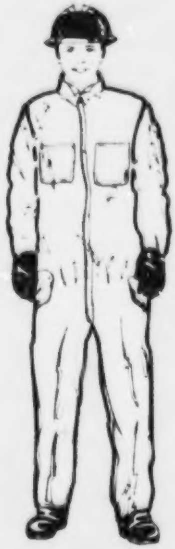
Protective clothing and equipment

Minimum protection

This is the minimum level of protection required when working with dilute, less toxic or granular pesticides. Where there is direct contact with the pesticide, add extra protection.



Hard Hat
(wide brimmed,
no leather liner)

Coveralls
cloth or disposable
(wear closed at neck,
over long-sleeved
shirt and full-length
pants)

Gloves
unlined, nitrile or
neoprene (cuff
gloves and wear
sleeves over gloves)

Boots
neoprene overboots or
high rubber boots
(wear pants outside
boots)

Extra protection

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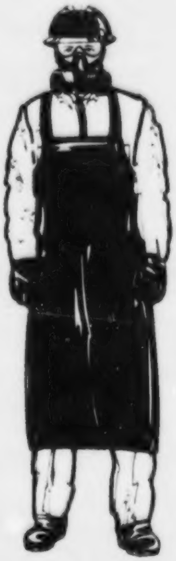

Goggles or
Face Shield

Ear Plugs

Respirator
(check label if
needed for less
toxic pesticides)

Coveralls
Chemically Resistant
(when mixing,
loading or applying
very toxic pesticides
and when application
drenches applicator)

Waterproof Apron
(when handling all
concentrated pesticides)

Mouth

Pesticides can enter the body through the mouth when users eat or smoke with contaminated hands or lick their lips. Face and hands should be washed thoroughly prior to eating or smoking. Children may be poisonsed if they drink pesticides which have been stored in pop bottles. All pesticides must be stored in their original containers and should be placed in a locked area out of reach of children.

Nose

Pesticides can enter the body if you breath in fumes, dusts or spray mists. Fumes and extremely fine particles of dust or spray can be completely absorbed by the lungs. To minimize exposure, respirators always should be worn when opening and mixing all concentrated pesticides. Read the pesticide label and follow precautions outlined. A respirator may be required when applying pesticides.

Coveralls

Wear coveralls, closed at the neckline and wrists and over full-length pants and long-sleeved shirts, also worn closed at the neckline and wrists.

Minimum protection

- Cloth: If cotton or cotton/polyester coveralls are worn, they should be washed after daily use. Some pesticides are difficult to remove from cloth.
- Disposable, nonwoven: A number of limited use, disposable, nonwoven, hooded coveralls are now on the market; instead of laundering, they are disposed of at an approved landfill and thus the problem of decontamination is avoided. Not all disposables are suitable for pesticide use, especially for liquid pesticides. Check with your supplier.

Common disposable brands are Kimberly-Clark KleenGuard® LP (Liquid Protection) and DuPont Tyvek®. Both disposables provide an extra layer of protection. Check for comfort and size before purchase. Disposable coveralls are more fragile than standard and are expected to last a limited number of wearings.

Extra protection

- DuPont's Tyvek® QC (polyethylene coated Tyvek) and Tyvek®/Saranex® (saran coated Tyvek) provide greater durability and are more repellent to larger pesticide spills. However, they are more expensive and must be specially ordered. These coveralls are uncomfortable when worn for long periods in hot weather, because of heat build up and lack of breathability.
- Impermeable rainwear: Two styles are available: coveralls or 2-piece suits. They are similar in price to the more expensive disposable coveralls. Generally, they are a P.V.C. (polyvinyl chloride) coating on nylon. Although excellent in liquid repellency, they too can be uncomfortable because they do not breathe, and cannot be worn for long periods in hot weather. After use, they should be hosed down and washed with soap and water.

Gloves

Unlined gloves are required when handling, mixing or pouring concentrated pesticides, during field application and when equipment needs adjusting. Never use bare hands to do these jobs. Studies reveal that the greatest exposure is often through the hands. A variety of glove materials may be found on the market. Unlined nitrile and neoprene gloves are suitable for most pesticides. All gloves should be washed soon after the concentrated chemical has been mixed as pesticide may penetrate into the material if it is not cleaned off. Care should be exercised to avoid contaminating the interior of gloves when they are taken off and put on. If possible, wash the outside of the gloved hands prior to glove removal, to avoid contaminating the interior. At the end of the day, both the inside and outside of the glove should be washed.

Remember, when using disposable coveralls . . .

- Before purchasing any disposable coveralls, make sure they are recommended by the manufacturer for pesticide use. Avoid wearing all-purpose disposables.
- When removing disposable coveralls, take care not to contaminate the interior if the coveralls are to be worn more than once. Between wearings, hang in a well-ventilated area, away from other clothing.
- Do not launder disposables, but do launder all clothing worn under disposables, just as you would other clothing worn during pesticide use.
- Replace with a new coverall when severe pilling (balls of fiber on the surface), rips or holes occur. To discard, place in a plastic garbage bag and take to an approved landfill site; do not burn.

Prior to use, inspect gloves and replace immediately if cracks, swelling, discoloration, holes or rips develop. Cuff glove, and wear sleeves over top of gloves to help prevent spills and splashes of pesticides from running down inside the gloves. Do not continue to wear contaminated gloves and avoid wearing leather, cloth or natural rubber gloves as they soak up the chemical and become a source of continuous contamination.

Boots
Neoprene overboots or long rubber boots are the recommended footwear as they are less likely to absorb pesticides and are more easily cleaned. Be sure to wear the pant leg over the boot to avoid pesticides running down into the boot. In case of such an accident, wash the boots out immediately, otherwise wash the outside of the boots daily.

Wide brimmed hard hat
Prevent powders, dusts, or spray mists from being deposited on the hair or scalp. The hard hat should be washed daily. Avoid the use of a hard hat with a leather inner band. When wearing a hooded disposable coverall, the hood may be used instead of a wide brimmed hard hat.

Goggles or face shields
Protect the eyes and face against pesticide vapors, dust and splashes when handling concentrated pesticides. Goggles and face shields must have resistance to chemicals and have ventilation to prevent fogging. Clean after each day of use and store away from direct sunlight.

Ear Plugs
Protect ears from dust sprays and spills when you are likely to contaminate the head. Ear plugs fit into the ear canal. Although reusable varieties are available, use disposable ear plugs made of self molding foam. Follow instructions for use. Wear once and dispose after use.

Respirators
Purchase a respirator recommended for the pesticides used and make sure it fits properly. A good airtight fit is required over the nose and mouth; beards and mustaches can prevent a close fit.

Respirators have two cartridges attached onto a facepiece. Each cartridge contains a prefilter which removes dust particles and a filter of activated charcoal which absorbs the chemical. The cartridges should be unscrewed and replaced as soon as any odor of the pesticides is detected in the facepiece. Clean respirators after each day's use; unscrew the cartridges and wash the facepiece with soap and water. Rinse the facepiece in clean water, dry with a clean cloth and screw on the cartridges. The clean respirator should be stored away from direct sunlight in a sealed plastic bag to prevent cartridges from absorbing airborne contaminants. Disposable respirators are also available. Replace as soon as any pesticide odor is detected. Wash after daily use – do not get the charcoal filter wet. Store in a sealed plastic bag. **Note:** Gauze and dust masks are not respirators and are not recommended for pesticide use!

Gas Masks
These are used when an applicator is likely to be exposed to very high levels of pesticides (fumigants). The face piece covers the eyes, nose and mouth. It is connected by a flexible hose to a charcoal canister worn on the belt. The lifespan of this canister is longer than that of the respirator cartridges. Manufacturer's directions are to be followed for cleaning and storing gas masks and canisters.

Minimize exposure

- **wear recommended protective clothing and safety equipment**
- **limit clothing worn for pesticide use to that use only**
- **wash clothing and equipment daily after use**
- **replace clothing and equipment that is no longer serviceable**

Avoid wearing

(These materials absorb chemicals and prolong exposure to the wearer; most are not easily cleaned).

- **fabric baseball caps**
- **cloth or leather gloves, shoes or boots**
- **natural rubber or plastic gloves (not resistant to pesticides)**
- **leather belts or watch bands**
- **contact lenses**

Mouth

Pesticides can enter the body through the mouth when users eat or smoke with contaminated hands or lick their lips. Face and hands should be washed thoroughly prior to eating or smoking. Children may be poisonsed if they drink pesticides which have been stored in pop bottles. All pesticides must be stored in their original containers and should be placed in a locked area out of reach of children.

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- **Do not launder disposables, but do launder all clothing worn under disposables, just as you would other clothing worn during pesticide use.**
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Prevent powders, dusts, or spray mists from being deposited on the hair or scalp. The hard hat should be washed daily. Avoid the use of a hard hat with a leather inner band. When wearing a hooded disposable coverall, the hood may be used instead of a wide brimmed hard hat.

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Minimize exposure

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- limit clothing worn for pesticide use to that use only
- wash clothing and equipment daily after use
- replace clothing and equipment that is no longer serviceable

Avoid wearing

(These materials absorb chemicals and prolong exposure to the wearer; most are not easily cleaned).

- fabric baseball caps
- cloth or leather gloves, shoes or boots
- natural rubber or plastic gloves (not resistant to pesticides)
- leather belts or watch bands
- contact lenses

Cleaning of Clothes and Equipment

Skin can absorb chemicals from inadequately cleaned clothing and equipment. Safe removal of pesticide demands special care in handling and washing contaminated clothes.

Handling pesticide soiled clothing

- handle soiled clothing with unlined, nitrile gloves
- remove pesticide granules from cuffs and pockets outdoors
- discard any garment saturated with pesticide concentrate
- temporarily store clothing in disposable plastic bags before washing
- take disposables to approved landfill

Washing pesticide soiled clothing

- wash daily
- wash separately from regular laundry
- pre-treat with a stain removal product if an emulsifiable formulation used or
- pre-rinse on pre-soak cycle of washer
- avoid overcrowding washer
- use hot water setting
- use full water level and normal cycle
- use extra heavy duty detergent as recommended for heavily soiled loads
- repeat wash procedure
- clean washer after use (run empty washer through full cycle with hot water and detergent)

Drying

- line dry to prevent contamination of dryer and increase the chemical breakdown of pesticide residues

Washing other equipment

- wash daily in hot soapy water; hard hat, goggles, apron, gloves, boots and respirator (avoid getting charcoal wet, remove if possible)

Specific Cleaning Procedures for Pesticides

The standard washing procedure mentioned above reduces pesticides from contaminated clothing, but gradually new research is identifying more specific washing procedures to further reduce the residues on contaminated clothing or equipment. Note that each product requires unique washing procedures and more testing is required for those that still have high residues remaining. Refer to the guide below:

Product	Suggested Washing Procedure	% Residue Remaining
2,4-D (amine)	One wash	<1%
2,4-D (ester)	1/2 hour Limonene soak (2) (degreaser), one wash	18% (1)
Triallate (Avadex)	Spray'n Wash soak (3), two washes	18% (1)
Iprodione (Rovral)	One wash	1%
Chlorpyrifos (Lorsban, Dursban, Pyrinex)	3 hour bleach soak (4), one wash	<1%
Malathion (diluted)	Two washes	3%
Diazinon	Hot wash (60°C) or Spray'n Wash soak, one wash	1%
Captan	One wash	1%
Any Concentrated Pesticides	Discard	Too high

Source: *Effective Pesticide Decomtamination Procedures for Clothing, Equipment and Spills, Research Project Report*, University of Alberta, Alberta Occupational Health and Safety Heritage Grant Program, 1994.

Recommendations:

1. 18% residue is an unacceptable level. For better protection, choose a disposable coverall and discard after use.
2. Soak contaminated clothing in undiluted limonene for required time. (Examples of this product are Odor Crush or Citra-Solv.)
3. Pre-treat contaminated clothing before washing, let soak.
4. Fill 70 L washing machine with warm water (50°C), add 280 mL of chlorine bleach. Soak for required time. (**Note:** loss of strength and color results from bleach soak, more so for cotton than for cotton/polyester blends) **Note: Acceptable levels of residue remaining: less than 3%.**

For further information on protective clothing for pesticide use:
Contact your local District office or Home Economics and 4-H Branch, Edmonton.

Other Precautions and Safety Tips

Fresh water supply
Always carry a supply of fresh water to clean up accidental spills and a clean pair of gloves for equipment adjustments.

Remote control devices
(e.g., solenoid valves) can be installed to remotely control the sprayer, preferably from within the tractor cab. This can reduce operator exposure to pesticides.

Tractor cab cleanup
After spraying pesticides, the inside of the tractor (seat, steering wheel, etc.) can be decontaminated by wiping with warm soapy water and a sponge.

Tractor cab filters
Charcoal filters are available for fitting onto the tractor air intake system, to filter out pesticides from the air entering the tractor cab. The use of these filters is highly recommended to reduce pesticide exposure during spraying operations. Check with tractor manufacturers to determine which charcoal filter is recommended for your tractor.

Grazing and haying restrictions

Traditionally, pesticides have been registered for use on crops grown to maturity. Grazing or cutting of the immature crop for hay has not been considered as the intended use and, therefore, residue information on the immature plant has not been requested in the registration process. A grazing or haying interval is considered in the registration process only if the green matter is to be fed to livestock. Consequently, many pesticide labels are currently silent about grazing, i.e., there is no statement on the label as to whether or not it is safe to graze the crop(s) listed on the label prior to maturity. The absence of this information may lead producers to assume that since there is no specific warning with respect to grazing, it is safe to do so.

Present pesticide labelling policy is meant to define only the acceptable uses of the product. It does not list or take into account the "do not's." Therefore, it cannot be assumed that if something is not stated on the label, it is accepted for use. A new accepted use can only be made through the submission of relevant data to support that use.

In light of the above, pesticide labels that are silent on grazing will carry the following statement: "Do not graze the treated crops or cut for hay; there are not sufficient data available to support such use".

Honey bee safety
Bees may be affected by pesticides. Avoid spraying near hives or contaminating puddles of water from which bees may drink. Spray early in the morning or late in the afternoon when bee activity is at a minimum. Warn beekeepers of your intentions, so they can confine the bees or move them until spraying is over.

Farm Safety Program

For further information on farm safety, please contact the Farm Safety Program of Alberta Agriculture, Food and Rural Development at **427-2186** or write to 7000 - 113 Street, Edmonton, Alberta, T6H 5T6.

Safety equipment and clothing

Protective clothing and equipment is available from the following:

Local U.F.A. and Alberta Pool	
Fleck Bros.	**1-800-262-9063**
Levitt-Safety Limited	**1-800-661-3973**
Safety Supply Canada	**1-800-661-3950**

Cleaning of Clothes and Equipment

Skin can absorb chemicals from inadequately cleaned clothing and equipment. Safe removal of pesticide demands special care in handling and washing contaminated clothes.

Handling pesticide soiled clothing

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- remove pesticide granules from cuffs and pockets outdoors
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- avoid overcrowding washer
- use hot water setting
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Drying

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Product	Suggested Washing Procedure	% Residue Remaining
2,4-D (amine)	One wash	<1%
2,4-D (ester)	1/2 hour Limonene soak (2) (degreaser), one wash	18% (1)
Triallate (Avadex)	Spray'n Wash soak (3), two washes	18% (1)
Iprodione (Rovral)	One wash	1%
Chlorpyrifos (Lorsban, Dursban, Pyrinex)	3 hour bleach soak (4), one wash	<1%
Malathion (diluted)	Two washes	3%
Diazinon	Hot wash (60°C) or Spray'n Wash soak, one wash	1%
Captan	One wash	1%
Any Concentrated Pesticides	**Discard**	Too high

Source: *Effective Pesticide Decontamination Procedures for Clothing, Equipment and Spills, Research Project Report*, University of Alberta, Alberta Occupational Health and Safety Heritage Grant Program, 1994.

Recommendations:

1. 18% residue is an unacceptable level. For better protection, choose a disposable coverall and discard after use.
2. Soak contaminated clothing in undiluted limonene for required time. (Examples of this product are Odor Crush or Citra-Solv.)
3. Pre-treat contaminated clothing before washing, let soak.
4. Fill 70 L washing machine with warm water (50°C), add 280 mL of chlorine bleach. Soak for required time. (**Note:** loss of strength and color results from bleach soak, more so for cotton than for cotton/polyester blends) **Note: Acceptable levels of residue remaining: less than 3%.**

For further information on protective clothing for pesticide use:
Contact your local District office or Home Economics and 4-H Branch, Edmonton.

Other Precautions and Safety Tips

Fresh water supply

Always carry a supply of fresh water to clean up accidental spills and a clean pair of gloves for equipment adjustments.

Remote control devices

(e.g., solenoid valves) can be installed to remotely control the sprayer, preferably from within the tractor cab. This can reduce operator exposure to pesticides.

Tractor cab cleanup

After spraying pesticides, the inside of the tractor (seat, steering wheel, etc.) can be decontaminated by wiping with warm soapy water and a sponge.

Tractor cab filters

Charcoal filters are available for fitting onto the tractor air intake system, to filter out pesticides from the air entering the tractor cab. The use of these filters is highly recommended to reduce pesticide exposure during spraying operations. Check with tractor manufacturers to determine which charcoal filter is recommended for your tractor.

Grazing and haying restrictions

Traditionally, pesticides have been registered for use on crops grown to maturity. Grazing or cutting of the immature crop for hay has not been considered as the intended use and, therefore, residue information on the immature plant has not been requested in the registration process. A grazing or haying interval is considered in the registration process only if the green matter is to be fed to livestock. Consequently, many pesticide labels are currently silent about grazing, i.e., there is no statement on the label as to whether or not it is safe to graze the crop(s) listed on the label prior to maturity. The absence of this information may lead producers to assume that since there is no specific warning with respect to grazing, it is safe to do so.

Present pesticide labelling policy is meant to define only the acceptable uses of the product. It does not list or take into account the "do not's." Therefore, it cannot be assumed that if something is not stated on the label, it is accepted for use. A new accepted use can only be made through the submission of relevant data to support that use.

In light of the above, pesticide labels that are silent on grazing will carry the following statement: "Do not graze the treated crops or cut for hay; there are not sufficient data available to support such use".

Honey bee safety

Bees may be affected by pesticides. Avoid spraying near hives or contaminating puddles of water from which bees may drink. Spray early in the morning or late in the afternoon when bee activity is at a minimum. Warn beekeepers of your intentions, so they can confine the bees or move them until spraying is over.

Farm Safety Program

For further information on farm safety, please contact the Farm Safety Program of Alberta Agriculture, Food and Rural Development at **427-2186** or write to 7000 - 113 Street, Edmonton, Alberta, T6H 5T6.

Safety equipment and clothing

Protective clothing and equipment is available from the following:

Local U.F.A. and Alberta Pool	
Fleck Bros.	1-800-262-9063
Levitt-Safety Limited	1-800-661-3973
Safety Supply Canada	1-800-661-3950

First Aid

Poison Information Centres (Alberta) 1-800-332-1414 (Calgary only) 670-1414

The emergency department of most hospitals can deal with pesticide poisoning. However, the Poison Centre in Calgary can provide information on recognizing poisoning symptoms and in giving the right treatment. It offers a 24-hour toll free service.

Some manufacturers have emergency telephone numbers to call in case of pesticide poisoning.

Cyanamid Canada Inc.
1-905-356-8310

Monsanto
1-314-694-1000

Novartis Crop Protection Canada Inc.
1-800-267-6351

Uniroyal Chemicals
1-519-744-3060

United Agri Products
1-800-561-8273

Zeneca Agro
1-416-528-6771
1-416-643-4123

Standard first aid measures

Before using a pesticide, look for the warning symbol on the label. This label indicates the toxicity of the pesticide. If you are severely exposed to a pesticide and you are alone, do not panic. The symptoms of the pesticide do not show up immediately. You will have some time to decontaminate yourself.

If on skin

Get any spilled pesticide off your body immediately. If the pesticide is on your clothes, remove them and rinse your skin with water. After rinsing, wash the area with soap and water. Obtain medical attention if area of contact is large or if irritation persists.

If in eyes

Wash eyes with water at once. Hold the eyelids open and wash eyes for at least 15 minutes with fresh water each time. Get help to take you to the emergency department of the nearest hospital and take the labelled container with you. Do not use any eye medication unless prescribed by a doctor.

If swallowed

Seek medical attention. Do not induce vomiting even though label instructions may say so. Health and Welfare Canada states that inducing vomiting by a non-trained person can be more hazardous to the victim than the chemical itself. Get to the nearest hospital as soon as possible.

Glossary of Terms in Pest Control

Acaricides: Pesticides that kill ticks and mites.

Active ingredient (a.i.): The concentration of chemical in a formulated product responsible for action.

Antagonism: Opposing action ot different chemicals such that the sum of their total effect is less than the effect if each pesticide were used alone.

Antidote: A first aid treatment to offset the toxic effect of a pesticide.

Bioassay: Determination of concentration of a pesticide by comparing its effect on a test organism with that of a standard preparation.

Carrier: Liquid or solid used to facilitate application of a pesticide.

Chlorotic: Loss or fading of green color in foliage.

Contact pesticide: Causes localized injury to plant tissue, or causes an effect when the pesticide hits the pest or the pest contacts the treated surface.

Degradation: Breakdown of a pesticide by action of air, water, sunlight microbes or other agents.

Desiccant: Chemical use to accelerate drying of plant tissues.

Efficacy: Effectiveness of chemical on the pest.

Established forage: A forage crop that has gone through three months of a growing season.

Foliar application: Made to the leaves of plants, as opposed to soil application.

Formulation: Form in which the manufacturer prepares a pesticide to facilitate its use – granular, solution, emulsifiable concentrate, dry flowable, liquid flowable, wettable powder.

Fumigant: Vapour active chemical used against pests.

Half-life: Time required to breakdown 50% of a pesticide.

Herbicide group: A collection of herbicides that have the same method of killing the weed.

Incompatibility: Where one pesticide cannot be satisfactorily mixed with another – mixture may gel, lose activity, settle out or be phytotoxic.

Inhibit: Prevent or stop a process, e.g., inhibits photosynthesis.

Mode of action: The specific mechanism through which a pesticide effects a pest.

Necrosis: Localized death of plant tissue – usually characterized by browning and desiccation.

Non-cropland: Land not in crop production or not intended for crop production.

Pesticide group: A number of pesticides which have the same mode of action.

Photosynthesis: Process by which green plants use sunlight, carbon dioxide and water to produce plant food.

Phytotoxic: Injurious to a plant.

Plant growth regulators (PGR): Chemical that affects the normal growth process of plants.

Preharvest interval (PHI): Time (days) between the last application of the pesticide and harvest. Harvest includes cutting (swathing) or grazing; it does not include combining or baling for hay.

Residual herbicide: Persists in soil, kills regrowth and/or germinating seedlings over an extended time.

Resistance: A genetic change in a pest population as a result of selection by a pesticide, which results in a loss of control.

Synergism: Complementary action of different pesticides such that the total effect is greater than the sum of their independent effects.

Systemic pesticide: Able to move in the plant, insect, or other organism from the initial point of contact.

Weed control: A minimum of 80% reduction in weed stand and/or growth.

Weed suppression: A minimum of 60% reduction in weed stand and/or growth.

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Chemical Weed Control in Alberta

Chemical weed control functions on the basis that certain chemicals are capable of killing some kinds of plants (weeds) without injury to other kinds (crops). As a group, these chemicals are called herbicides. Herbicides are effective tools for the control of weeds, and **herbicides demand respect**. When properly used, herbicides can safely and effectively accomplish their objective; misused, they can cause severe economic loss. The misuse of herbicides is usually due to:

- ignorance of their characteristic activity and/or,
- carelessness in their application.

Misuse includes such factors as: applying improper dosages; using the wrong herbicide; failure to properly calibrate application equipment; failure to wash application equipment thoroughly before switching herbicides; improper soil incorporation; timeliness of application, with respect to the growth stage of crop or weed.

This guide lists the major herbicides registered for field crop use in Alberta. Refer to product labels, attached to the herbicide containers, for final detailed information.

Conservation tillage and herbicides

Conservation tillage is a general term used to describe a cropping program in which some or all of the tillage operations are replaced by using herbicides to control weed growth and, at the same time, preventing soil erosion and conserving soil moisture. The following terminologies are included under conservation tillage: reduced tillage, minimum tillage, no-tillage or zero tillage, direct drilling and chemical fallow.

Herbicides for conservation tillage are listed below. Rates of application, weeds controlled and other pertinent information can be found by referring to each herbicide in this guide.

- **2,4-D or MCPA:** To control winter annuals such as flixweed, shepherd's-purse and stinkweed. Application should be made to emerged weeds prior to freeze-up.
- **Heritage:** Use in the Brown soil zone only during the fallow year.
- **Glyphosate Formulation:** Apply any glyphosate formulation mixed with a non-ionic surfactant (if required) to actively growing weeds. Can be tank mixed with Banvel; 2,4-D amine; Pardner.
- **Rustler:** Controls annual grasses, broadleaf weeds and volunteer cereals. Can be tank mixed with 2,4-D.

Nitrate poisoning of livestock

Nitrate accumulations may be caused by leaf damage from frost, hail or herbicide action. Symptoms of nitrate poisoning include reduced milk production and growth rate, abortions and in severe cases, death by suffocation. A veterinarian should be called immediately if livestock show unusual symptoms when they are fed forages which may contain nitrates.

After severe frost, hail or herbicide damage, the nutrient value of the crop will decrease rapidly. In terms of nutrition, it is important to harvest as soon as practical – however in the case of herbicide treated crops, there may be a waiting period specified on the herbicide label. Especially in the case of high risk crops, such as oats or corn, a delay may be advisable to permit nitrate levels to decrease. If there is a possibility of high nitrates in feed, have the feed analysed at a feed testing laboratory.

Weed control in forage crops

Make sure all forages, as well as any companion crops, present in the stand are listed for the intended use on the herbicide label. Follow the label directions on the herbicide container closely, particularly as they relate to stage of crop and weed development, water volume, grazing and feeding restrictions.

Herbicide performance ratings

Herbicide performance ratings (numbers in brackets after the names of crops or weeds) are based on data from the Expert Committee on Weeds (Western Section) Research Reports. These numbers are not absolute and, therefore, not a guarantee of expected performance. They are meant to be used as as guide when selecting a herbicide. When a number is not included, there is not sufficient data to provide a rating.

Tolerance of crop to herbicides

The number appearing in brackets following the crop on which each herbicide is registered represents the expected tolerance of the crop to that herbicide. Due to variations in variety, weather, timing and application techniques, this number is only approximate. 0 = complete kill of the crop and 9 = no measurable injury to the crop.

Level of weed control with each herbicide

The number appearing in brackets after each weed represents the average level of weed control expected with the herbicide. Due to variation in weather, growth stage, time of day, application technique, etc., this number is only approximate. 0 = no control of the weed and 9.0 = complete kill of the weed. A weed control rating of 7.0 or greater is considered commercially acceptable.

M121

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Water Used for Spray Application

The quality of water used can affect the efficacy of some herbicides. Water quality includes the cleanliness (silt, organic matter and soil), the hardness or softness of the water and the water pH.

Some herbicides, including Roundup/Touchdown, adsorb to silt and become inactivated. This causes a decrease in herbicidal activity. Silty water is usually a problem where surface water is being used.

Other herbicides, including 2,4-D amine and several Group 1 herbicides have reduced efficacy when applied in mineralized water. Minerals include both calcium and magnesium sulfates which result in 'hard' water and excessive sodium bicarbonate which results in 'soft' water. Mineralized water is most commonly a problem when well-water is used. When efficacy decreases, it is most apparent on hard to control weeds and is easily confused with late application, poor growing conditions or reduced herbicides rates.

The pH of water or water temperature can affect the ability of some herbicides to stay dissolved in the spray solution. To avoid these problems, the manufacturer will suggest a specific order to add surfactant or mixtures of products. For example, to mix the herbicide Horizon, the herbicide is added first, followed by the surfactant, Score, and all mixing is done under agitation. Follow label recommendations for mixing. Products cannot work unless they are dissolved or miscible in the water. Also, if products are not in solution they can form a sludge in the spray tank and block nozzles.

It is best to avoid using poor quality water if possible; however, the following remedies can limit the loss of herbicidal activity.

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] (1% v/v)
[illegible]	[illegible]	[illegible] (1% v/v)
[illegible]	[illegible]	[illegible] (1% v/v)

*Note 2,4-D ester formulation is not affected.
Information primarily derived from F. A. Holm, J. L. Henry, D. W. Gruber and P. McMullan, 1995 Water quality effects on phenoxy and ACCase inhibiting herbicides. Proceedings of the Weed Research /Symposium, University of Alberta.

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It is best to avoid using poor quality water if possible; however, the following remedies can limit the loss of herbicidal activity.

Herbicide	**Quality Concern**	**Remedy**
Roundup/Touchdown	silty or dirty water	Filter water or use clean water
Roundup/Touchdown	mineralized water	add ammonium sulfate fertilizer 3 kg/100 L application solution
2,4-D amine*	mineralized water	use a non-ionic surfactant like Agral 90
Achieve (tralkoxydim)	mineralized water	add ammonium sulfate (1% v/v)
Poast (sethoxydim)	mineralized water	add ammonium sulfate (1% v/v)
Select (clethodim)	mineralized water	add ammonium sulfate (1% v/v)

*Note 2,4-D ester formulation is not affected.

Information primarily derived from F. A. Holm, J. L. Henry, D. W. Gruber and P. McMullan. 1995 Water quality effects on phenoxy and ACCase inhibiting herbicides. Proceedings of the Weed Research Symposium. University of Alberta.

Herbicide Resistance

Agricultural pests can develop resistance to fungicides, herbicides or insecticides. In Alberta, it is the resistance to herbicides that is of major concern. The number of herbicide resistant weeds and the area presently infested by them continues to increase. In 1989, seven sites were confirmed to have triallate (Avadex BW) resistant wild oats. By 1991, this number had more than doubled. Presently, four weed species and four different herbicides are affected by resistance. Producers applying herbicides should be able to identify herbicide resistant weeds if they are present, but more importantly, they should be able to minimize or prevent the development of resistance on their farms.

How to identify herbicide resistance

Investigate all areas of the sprayed field where weed control did not occur. Rule out other factors that might have affected herbicide performance including misapplication, spray misses, unfavorable weather conditions, herbicide application at an improper leaf stage and weed flushes after application. If resistance remains a likely possibility, check for the following:

- Are other weeds listed on the product label controlled satisfactorily?
- Is herbicide failure patchy with no reasonable explanation?
- Did the same herbicide or herbicide group (see Table 1) fail in this area of the field in the previous year?
- Do weeds show herbicide injury symptoms such as root pruning by trifluralin or yellow/purple coloration caused by Ally applications. Resistant weed biotype will not show these typical injury symptoms.
- Do field histories indicate extensive use of the same herbicide (or herbicide group) year after year?

How to minimize the development of resistance

Follow the guidelines below to delay the appearance of resistance.

- Use herbicides only when needed – Use herbicides as part of an integrated control program and not as the sole method of weed control.
- Rotate Herbicides – Herbicides must be rotated. It is important not only to use a different herbicide but to use one from a different herbicide group with a different mode of action.
- Keep records of herbicide applications – Records are needed to make sensible decisions on herbicide rotation and to evaluate the probability of resistance developing. A pesticide application record sheet can be found at the back of this book.
- Use tank mixes – A tank mix may delay the appearance of resistant to weeds if the components of the tank mix control the same weed by a different mode of action.

If resistance is suspected, contact either your local extension office, weed specialist or the appropriate chemical company to follow up on the problem.

Group Classification by Modes of Action of Herbicides

	Mode of Action	Active Ingredients	Found In
Group 1	ACCase Inhibitors	clethodim	Select
		clodinafop-propargyl	Horizon, Harmony Total
		diclofop-methyl	Hoe-Grass 284, Hoe-Grass II
		fenoxaprop-p-ethyl	Champion Extra, Champion Plus, Fusion, Laser DF, Puma One Pass, Puma Super, Puma^{120} Super, Triumph Plus
		fluazifop-p-butyl	Fusion, Venture
		quizalofop-p-ethyl	Assure II, Muster Gold, Muster Gold II
		sethoxydim	Flaxmax Ultra, Poast Ultra
		tralkoxydim	Achieve, Achieve Extra, Prevail
Group 2	ALS/AHAS Inhibitors	chlorsulfuron	Telar
		ethametsulfuron-methyl	Muster, Muster Gold, Muster Gold II
		imazamethabenz	Assert 300
		imazamox	Odyssey
		imazethapyr	Odyssey, Pursuit
		imazapyr	Arsenal
		metsulfuron-methyl	Ally, Escort
		nicosulfuron	Accent
		rimsulfuron	Prism
		sulfosulfuron	Anthem, Sundance
		thifensulfuron-methyl	Champion Extra, Champion Plus, Harmony Total, Laser DF, Refine Extra, Triumph Plus
		triasulfuron	Amber, Unity
		tribenuron-methyl	Champion Extra, Crossfire, Express Pack, Harmony Total, Muster Gold, Refine Extra
Group 3	Microtubule Biosynthesis Inhibitors	ethalfluralin	Edge
		trifluralin	Advance 10G, Bonanza, Fortress, Heritage, Rival, Treflan
Group 4	Growth Regulator Herbicides	2,4-D	2,4-D, Anthem, Attain, Champion Plus, Dichloprop D, DyVel DS, Estaprop, Thumper, Tropotox Plus, Turboprop, Weedone CB
		2,4-DB	2,4-DB, Caliber, Cobutox, Embutox
		2,4-DP (dichlorprop)	Diphenoprop BK700, Weedone CB
		clopyralid	Curtail M, Lontrel, Poast Flaxmax, Prestige, Prevail, Transline
		dicamba	Banvel, Banvel II, DyCleer, DyVel, DyVel DS, Rustler, Target
		fluroxypyr	Attain, Prestige
		MCPA	Achieve Extra, Breaker, Buctril M, Champion Plus, Clovitox Plus, Curtail M, DyVel, Flaxmax Ultra, Laser DF, MCPA, Pea Pack, Prestige, Prevail, Puma One Pass, Target, Triumph Plus, Tropotox Plus
		MCPB	Clovitox Plus, Tropotox Plus
		mecoprop	Compitox, DyVel DS, Mecoprop, Target
		picloram	Tordon
		quinclorac	Accord
		triclopyr	Fencerow, Garlon
Group 5	Photosynthetic Inhibitors	atrazine	Atrazine, Laddok, Primextra Light, Shotgun
		bromacil	Hyvar X/XL, Krovar
		cyanazine	Bladex
		desmedipham	Betamix, Betanex
		hexazinone	Pronone, Velpar
		metribuzin	Breaker, Crossfire, Pea Pack, Sencor
		phenmedipham	Betamix
		simazine	Princep Nine-T, Simazine

Group Classification by Modes of Action of Herbicides

	Mode of Action	Active Ingredients	Found In
Group 6	Photosynthetic Inhibitors	bromoxynil bentazon pyridate	Achieve Extra, Buctril M, Hoe-Grass II, Pardner, Puma One Pass, Thumper, Unity Basagran, Laddok Lentagran
Group 7	Photosynthetic Inhibitors	diuron linuron propanil	Karmex, Krovar Afolan F, Linuron, Lorox Stampede EDF
Group 8	Lipid Synthesis Inhibitors	butylate difenzoquat EPTC triallate	Sutan+ Avenge 200-C Eptam, Eradicane 8-E Avadex BW, Fortress
Group 9	EPSP Inhibitors	glyphosate	Credit, Glyfos, Renegade, Roundup, Roundup Fast Forward, Rustler, Touchdown, Vantage, Vantage Plus, Victor
Group 10	Glutamine Synthetase Inhibitors	glufosinate ammonium	Liberty, Roundup Fast Forward
Group 11	Bleaching	amitrole	Amitrol-T
Group 15	Unknown	metolachlor propyzamide	Dual, Primextra Light Kerb 50W
Group 22	Photosynthetic Inhibitors	diquat paraquat	Gramoxone PDQ, Reglone, Reglone A, Reglone Pro Gramoxone, Gramoxone PDQ
Group 25	Unknown	flamprop-methyl	Mataven L
Group 26	Unknown	TCA	TCA

Accent *(nicosulfuron)*

Group 2

Manufacturer: **DuPont Canada Inc.**

1. **Formulations:** Dry Flowable; 75%; Toss-N-Go 133.6 g (4 x 33.4 g) water soluble pouches.
2. **Registered Mixes:** None.

   Surfactants: Agral 90, Ag-Surf, Citowett Plus.

   Mixing instructions:
   1. Fill clean tank 1/4 full with clean water.
   2. Turn on full agitation.
   3. Add the proper amount of Accent to the water in the spray tank with the agitator running. Maintain full agitation until water soluble bags are completely dissolved and product is fully dispersed. Continuous agitation is required to keep the product in suspension.
   4. After Accent has been well mixed and is in suspension, add a recommended non-ionic surfactant.
   5. Add the remainder of the water.

   On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of the volume to be mixed.
3. **Crops:** Field corn.
4. **Weeds Controlled:**

   barnyard grass
   fall panicum
   green foxtail
   old witchgrass
   quackgrass
   wild oats
5. **Weeds Suppressed:** Yellow foxtail.
6. **When Used:** Apply when the corn is between the 1 - 8 leaf stage (6 visible collars). The coleoptile (short, blunt leaf) is counted as the first leaf.

   Annual grassy weeds: Wild oats: 3 - 6 leaves; all others: 1 - 6 leaves (maximum 2 tillers).

   Quackgrass: 3 - 6 leaves (10 - 20 cm in height, leaf extended).
7. **How To Apply:**

   With: Ground equipment. Do not apply by air.

   Rate: 13.5 g/ac.

   Surfactant: 2 L/1000 L of spray solution.

   Water volume: 40 L/ac (minimum).

   Pressure: 175 - 275 kPa.

   Nozzles: Flat fan types. 50 mesh screens or larger.

   Sprayer clean-up: To avoid subsequent injury to desirable crops, thoroughly clean all mixing and spray equipment immediately after spraying as follows:
   1. Drain tank; thoroughly hose down the interior surfaces of the tank; then flush tank, boom and hoses with clean water for a minimum of 5 minutes.
   2. Fill the tank with clean water while adding 1 litre of household ammonia (containing a minimum of 3% ammonia) for every 100 litres of water. Flush the hoses, boom and nozzles with the cleaning solution and then add more water to completely fill the tank. Circulate the cleaning solution through the tank and hoses for at least 15 minutes. Again flush the hoses, boom and nozzles with the cleaning solution and then drain the tank.
   3. Remove the nozzles and screens, and clean separately in a bucket containing cleaning agent and water.
   4. Repeat step 2.
   5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom.
   6. **Prior** to using the sprayer for the next application, flush the tank, boom and hoses for 5 minutes with fresh water.

8. **Application Tips:** **Do not** tank mix Accent with any organophosphorus insecticide. **Do not** apply a foliar organophosphorus insecticide within 7 days before or after applying Accent. When corn is injured by frost, wait 48 - 72 hours before applying Accent. Stress conditions after application may also result in injury or poor weed control.
9. **How it Works:** Accent rapidly stops the growth of susceptible species; typical symptoms usually appear within 5 - 7 days, but may not be noticeable for 2 - 3 weeks after application, depending on the prevailing growing conditions.
10. **Expected Results:** Poor weed control or crop injury may result from applications made to plants under stress from abnormally hot or cold weather; environmental conditions such as drought, water-saturated soils, hail damage or frost; disease, insect or nematode injury; prior herbicide or carryover from a previous year's herbicide application.
11. **Effects of Rainfall:** Rainfall within 2 - 4 hours after application may reduce weed control.
12. **Movement in Soil:** None.
13. **Grazing and Cropping Restrictions:** Corn and spring cereals (including wheat and barley) crops may be planted the year following Accent application. For all other crops, a field bioassay is recommended before planting. Do not graze the treated crops or cut for hay. Accent must not be applied within 30 days of harvest. Do not plant sugarbeets until a field bioassay indicates it is safe to do so.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) greater than 5,000.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a dry place. Keep water soluble bags away from moisture.
17. **Resistance Management:** Some naturally occurring populations of certain weeds listed on this label may not be controlled by Accent or other herbicides with the same mode of action (ALS/AHAS enzyme inhibitors). These resistant weed populations are able to survive use rates several times higher than required to control susceptible populations. To delay selection for resistant populations, rotate the use of ALS/AHAS inhibitor herbicides with other herbicides effective on the same weeds. Avoid the use of ALS/AHAS inhibitor herbicides repeatedly in the same field.

Accord *(quinclorac)*

Group 4

CAUTION POISON

Manufacturer: **BASF**

1. **Formulations:** Dry Flowable 75%; 2 x 1.1 kg bags of Accord and 2 x 8.1 L jugs of Merge.
2. **Registered Mixes:** Avenge 200-C, Buctril M, Refine Extra, 2,4-D (Amine and Ester), MCPA (Amine and Ester), Express Pack. When tank mixing with Avenge 200C, use only on spring wheat varieties listed on the Avenge 200-C label. Do not apply these tank mixes on canary seed.

   Surfactant: Use only Merge adjuvant with all tank mixtures.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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Accord (cont'd)

Mixing instructions:

1. Thoroughly clean the sprayer prior to use. For appropriate cleaning instructions, refer to the label of the product sprayed previous to application of Accord.
2. Fill the spray tank half full with clean water. Start agitation and keep running during the entire mixing procedure.
3. Add the correct amount of Accord and agitate 2 to 3 minutes.
4. Add the correct amount of broadleaf herbicide, followed by Avenge 200-C, if required. When mixing Accord with Express Pack, Express herbicide must be completely in suspension in the spray tank prior to adding 2,4-D herbicide.
   Note: On repeat tank loads of either Express Pack or Refine Extra, prepare an Express/water or Refine/water slurry in a separate container with clean water before adding to the spray tank.
5. Add the correct amount of Merge adjuvant and agitate 2 to 3 minutes.
6. Add remainder of water to the spray tank and maintain sufficient agitation during mixing and spraying to ensure a uniform spray mixture.

3. Crops: Barley (grown for feed), wheat (hard red spring, canada prairie spring, durum, Canada Western extra strong), canary seed.

4. Weeds Controlled: Green foxtail (8.0)(including Group 1 and Group 3 resistant biotypes), volunteer flax (8.2), cleavers (8.0) and barnyard grass.

5. Weeds Suppressed: None.

6. When Used: Barley: 1 - 4 leaf (prior to tillering). Wheat (spring and durum): 1 - 5 leaves. Canary seed: 3 - 5 leaves. Green foxtail: 1 - 5 leaf, max 2 tillers. Volunteer flax: 1 - 8 cm. Cleavers: 1 - 3 whorls. Barnyard grass: 1 - 5 leaf. **All leaf stages listed above refer to true leaves.** Most effective when weeds are small and actively growing.

7. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: 55 - 67 g/ac (Do not use a rate higher than 55 g/ac for barley).

Broadleaf weed control: Although Accord provides control of several broadleaf weeds, a tank mix with a broadleaf compound is required to give a broad spectrum of broadleaf weed control.

Broadleaf tank mixes

Tank Mix Partner	Product rate	Crop stage
Buctril M	400 mL/ac	2 - 5 leaf stage
2,4-D Amine 500	340 mL - 445 mL/ac	3 - 5 leaf stage
2,4-D Ester 500	340 mL - 445 mL/ac	4 - 5 leaf stage
MCPA Amine 500	340 mL - 445 mL/ac	3 - 5 leaf stage
MCPA Ester 500	340 mL - 445 mL/ac	3 - 5 leaf stage
Refine Extra*	8 g/ac	2 - 5 leaf stage
Express Pack* (Express + 2,4-D)	4 g/ac + 253 mL/ac	3 - 5 leaf stage

* Addition of surfactants other than Merge adjuvant is not required.

* Always refer to the broadleaf herbicide's label for additional precautions, restrictions and use instructions.

Wild oat control: For control of wild oats, when populations are between 1 - 200 plants/m^2, Accord can be tank mixed with Avenge 200-C. **Note:** Avenge 200-C can cause some crop injury.

Tank mixing for wild oat control

Tank Mix Partner	Product rate	Crop stage
Avenge 200-C*	1.4 L/ac	1 - 5 leaf stage

* Always refer to the Avenge 200-C label for additional precautions, restrictions and use instructions.

Wild oat and broadleaf weed control: For control of wild oats and certain broadleaf weeds, Accord can be tank mixed with Avenge 200-C at 1.4 L/ac and one of the following broadleaf herbicides.

Tank mixing for wild oat and broadleaf weed control

Broadleaf Tank Mix Partner	Product rate	Crop stage
Buctril M	400 mL/ac	2 - 5 leaf stage
2,4-D Ester 500	340 mL - 445 mL/ac	4 - 5 leaf stage
MCPA Ester 500	340 mL - 445 mL/ac	3 - 5 leaf stage
Refine Extra*	8 g/ac	2 - 5 leaf stage

* Addition of surfactants other than Merge adjuvant is not required.
* Always refer to both the Avenge 200-C and the broadleaf herbicide label for additional precautions, restrictions and use instructions.

Water volume: 40 L/ac.

Pressure: 275 - 425 kPa.

Nozzle: Standard flat fan nozzles recommended. Use 50 mesh strainers and screens.

Sprayer clean up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after use and prior to spraying other crops by performing the following steps:

1. Following spray application, drain any remaining spray solution, then flush the tank, (repeat, if necessary).
2. Completely fill spray tank with clean water while adding 1 liter of household ammonia (containing 3% ammonia) per 100 litres of water or a commercially licensed tank cleaner such as Finish. Reduce amount of ammonia added proportionally if higher concentrations (%) of ammonia are used. Flush solution through boom and nozzles and then add more water to completely refill the tank. Agitate the solution for at least 15 minutes and then flush the boom and nozzles until the spray tank is empty.
3. Remove the nozzles and screens and clean separately in a bucket containing a cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water and flush the water through the boom.

8. **Application Tips:** Use the 55 g/ac rate **only** for control of volunteer flax, barnyard grass, cleavers and lighter infestations of green foxtail. Use the higher rate of 67 g/ac for control of heavier infestations of green foxtail. Use only the 55 g/ac rate when applying Accord to barley. Early treatment of weeds with Accord herbicide is important to maximize crop yield potential through elimination of early weed competition. When tank mixing Accord with the broadleaf herbicides, a slight reduction in control of green foxtail may be observed. The level of green foxtail control may be improved by using the 67 g/ac rate of Accord in the tank mixture. Do not delay spraying broadleaf weeds if grassy weeds are not in the correct stage for treatment. If green foxtail, wild oats and broadleaf weeds are not in the correct stage for treatment, apply separate applications of each herbicide timed to control the required spectrum of weeds.
9. **How it Works:** Uptake into the plant occurs through both the foliage and root system.
10. **Expected Results:** Visual symptoms of weed control of Accord may take up to two weeks following application to develop. These symptoms include initial twisting to stunting, reddening and chlorosis at about 14 days followed by necrosis and death about 21 days after application. Even though Accord symptoms may take some time to develop, competition from the weeds treated with Accord is eliminated soon after application.
11. **Effects of Rainfall:** Rainfall within 6 hours after application may reduce effectiveness.
12. **Movement in Soil:** Under normal prairie conditions, there is little movement of Accord in the soil.

Accord (cont'd)

Mixing instructions:

1. Thoroughly clean the sprayer prior to use. For appropriate cleaning instructions, refer to the label of the product sprayed previous to application of Accord.
2. Fill the spray tank half full with clean water. Start agitation and keep running during the entire mixing procedure.
3. Add the correct amount of Accord and agitate 2 to 3 minutes.
4. Add the correct amount of broadleaf herbicide, followed by Avenge 200-C, if required. When mixing Accord with Express Pack, Express herbicide must be completely in suspension in the spray tank prior to adding 2,4-D herbicide.
   Note: On repeat tank loads of either Express Pack or Refine Extra, prepare an Express/water or Refine/water slurry in a separate container with clean water before adding to the spray tank.
5. Add the correct amount of Merge adjuvant and agitate 2 to 3 minutes.
6. Add remainder of water to the spray tank and maintain sufficient agitation during mixing and spraying to ensure a uniform spray mixture.

3. Crops: Barley (grown for feed), wheat (hard red spring, canada prairie spring, durum, Canada Western extra strong), canary seed.

4. Weeds Controlled: Green foxtail (8.0)(including Group 1 and Group 3 resistant biotypes), volunteer flax (8.2), cleavers (8.0) and barnyard grass.

5. Weeds Suppressed: None.

6. When Used: Barley: 1 - 4 leaf (prior to tillering). Wheat (spring and durum): 1 - 5 leaves. Canary seed: 3 - 5 leaves. Green foxtail: 1 - 5 leaf, max 2 tillers. Volunteer flax: 1 - 8 cm. Cleavers: 1 - 3 whorls. Barnyard grass: 1 - 5 leaf. **All leaf stages listed above refer to true leaves.** Most effective when weeds are small and actively growing.

7. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: 55 - 67 g/ac (Do not use a rate higher than 55 g/ac for barley).

Broadleaf weed control: Although Accord provides control of several broadleaf weeds, a tank mix with a broadleaf compound is required to give a broad spectrum of broadleaf weed control.

[illegible]

[illegible]	[illegible]	[illegible]
Buctril M	400 mL/ac	2 - 5 leaf stage
2,4-D Amine 500	340 mL - 445 mL/ac	3 - 5 leaf stage
2,4-D Ester 500	340 mL - 445 mL/ac	4 - 5 leaf stage
MCPA Amine 500	340 mL - 445 mL/ac	3 - 5 leaf stage
MCPA Ester 500	340 mL - 445 mL/ac	3 - 5 leaf stage
Refine Extra*	8 g/ac	2 - 5 leaf stage
Express Pack* (Express + 2,4-D)	4 g/ac + 253 mL/ac	3 - 5 leaf stage

* Addition of surfactants other than Merge adjuvant is not required.

* Always refer to the broadleaf herbicide's label for additional precautions, restrictions and use instructions.

Wild oat control: For control of wild oats, when populations are between 1 - 200 plants/m^2, Accord can be tank mixed with Avenge 200-C. **Note:** Avenge 200-C can cause some crop injury.

[illegible]

[illegible]	[illegible]	[illegible]
Avenge 200-C*	1.4 L/ac	1 - 5 leaf stage

* Always refer to the Avenge 200-C label for additional precautions, restrictions and use instructions.

7

Wild oat and broadleaf weed control: For control of wild oats and certain broadleaf weeds, Accord can be tank mixed with Avenge 200-C at 1.4 L/ac and one of the following broadleaf herbicides.

Tank mixing for wild oat and broadleaf weed control

Broadleaf Tank Mix Partner	Product rate	Crop stage
Buctril M	400 mL/ac	2 - 5 leaf stage
2,4-D Ester 500	340 mL - 445 mL/ac	4 - 5 leaf stage
MCPA Ester 500	340 mL - 445 mL/ac	3 - 5 leaf stage
Refine Extra*	8 g/ac	2 - 5 leaf stage

* Addition of surfactants other than Merge adjuvant is not required.

* Always refer to both the Avenge 200-C and the broadleaf herbicide label for additional precautions, restrictions and use instructions.

Water volume: 40 L/ac.

Pressure: 275 - 425 kPa.

Nozzle: Standard flat fan nozzles recommended. Use 50 mesh strainers and screens.

Sprayer clean up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after use and prior to spraying other crops by performing the following steps:

1. Following spray application, drain any remaining spray solution, then flush the tank, (repeat, if necessary).
2. Completely fill spray tank with clean water while adding 1 liter of household ammonia (containing 3% ammonia) per 100 litres of water or a commercially licensed tank cleaner such as Finish. Reduce amount of ammonia added proportionally if higher concentrations (%) of ammonia are used. Flush solution through boom and nozzles and then add more water to completely refill the tank. Agitate the solution for at least 15 minutes and then flush the boom and nozzles until the spray tank is empty.
3. Remove the nozzles and screens and clean separately in a bucket containing a cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water and flush the water through the boom.

8. **Application Tips:** Use the 55 g/ac rate **only** for control of volunteer flax, barnyard grass, cleavers and lighter infestations of green foxtail. Use the higher rate of 67 g/ac for control of heavier infestations of green foxtail. Use only the 55 g/ac rate when applying Accord to barley. Early treatment of weeds with Accord herbicide is important to maximize crop yield potential through elimination of early weed competition. When tank mixing Accord with the broadleaf herbicides, a slight reduction in control of green foxtail may be observed. The level of green foxtail control may be improved by using the 67 g/ac rate of Accord in the tank mixture. Do not delay spraying broadleaf weeds if grassy weeds are not in the correct stage for treatment. If green foxtail, wild oats and broadleaf weeds are not in the correct stage for treatment, apply separate applications of each herbicide timed to control the required spectrum of weeds.
9. **How it Works:** Uptake into the plant occurs through both the foliage and root system.
10. **Expected Results:** Visual symptoms of weed control of Accord may take up to two weeks following application to develop. These symptoms include initial twisting to stunting, reddening and chlorosis at about 14 days followed by necrosis and death about 21 days after application. Even though Accord symptoms may take some time to develop, competition from the weeds treated with Accord is eliminated soon after application.
11. **Effects of Rainfall:** Rainfall within 6 hours after application may reduce effectiveness.
12. **Movement in Soil:** Under normal prairie conditions, there is little movement of Accord in the soil.

Accord (cont'd)

13. **Grazing and Cropping Restrictions:** Do not graze the treated crops or cut for hay within 77 days of application. Do not apply Accord in wheat underseeded to forages. Accord must not be applied within 77 days of harvest.

	[illegible]	
[illegible]	[illegible]	Notes
Wheat* (Spring, durum) Barley*	0	These crops can be re-planted in the same season as Accord applications.
Canola Field peas Sunflowers	10 10 10	These crops and the crops listed above can be planted the year following application of Accord.
Flax Lentils	22 22	These crops and the crops listed above can be planted two years after application of Accord.

* In the event of crop failure, only spring or durum wheat or barley may be reseeded in fields treated with Accord.

Accord should not be used on land where potatoes or vegetables are part of the rotation. BASF recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed in the cropping restriction table. On lighter soils with low organic matter or under dry conditions, some crop injury may occur, particularly in flax and lentils, but will not reduce yield. Under these conditions,the minimum recropping interval for flax and lentils, should be extended by 12 months. **Refer to the broadleaf or Avenge 200-C herbicide label for specific, additional recropping restrictions.**

14. **Toxicity:** The technical active ingredient has demonstrated low toxicity to laboratory animals, birds, fish, aquatic invertebrates and pollinating insects. Acute oral LD_{50} (rats) = >2610 mg/kg.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry well-ventilated area. Freezing will not harm Accord.
17. **Resistance Management:** To reduce the selection pressure that could contribute to the development of resistant biotypes, do not apply Accord to any field more often than every second year.

Accord (cont'd)

13. **Grazing and Cropping Restrictions:** Do not graze the treated crops or cut for hay within 77 days of application. Do not apply Accord in wheat underseeded to forages. Accord must not be applied within 77 days of harvest.

	Cropping restrictions	
Crop	Minimum recropping interval (Months)	Notes
Wheat* (Spring, durum) Barley*	0	These crops can be re-planted in the same season as Accord applications.
Canola	10	These crops and the crops listed above can be planted the year following application of Accord.
Field peas	10	
Sunflowers	10	
Flax	22	These crops and the crops listed above can be planted two years after application of Accord.
Lentils	22	

* In the event of crop failure, only spring or durum wheat or barley may be reseeded in fields treated with Accord.

Accord should not be used on land where potatoes or vegetables are part of the rotation. BASF recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed in the cropping restriction table. On lighter soils with low organic matter or under dry conditions, some crop injury may occur, particularly in flax and lentils, but will not reduce yield. Under these conditions,the minimum recropping interval for flax and lentils, should be extended by 12 months. **Refer to the broadleaf or Avenge 200-C herbicide label for specific, additional recropping restrictions.**

14. **Toxicity:** The technical active ingredient has demonstrated low toxicity to laboratory animals, birds, fish, aquatic invertebrates and pollinating insects. Acute oral LD_{50} (rats) = >2610 mg/kg.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry well-ventilated area. Freezing will not harm Accord.
17. **Resistance Management:** To reduce the selection pressure that could contribute to the development of resistant biotypes, do not apply Accord to any field more often than every second year.

Achieve 80DG *(tralkoxydim)*

Group 1

Manufacturer **Zeneca Agro**

CAUTION POISON

1. **Formulations:**

   Achieve 80DG: Dispersible grain; 80%; 2 x 2 kg carton, Turbocharge (adjuvant); 8 L jug.

2. **Registered Mixes:** 2,4-D Ester, Attain, MCPA ester, Buctril M, Buctril M plus MCPA ester, Buctril M plus Decis, Cobutox, Curtail M, Decis, diclorprop + 2,4-D (Estaprop, Diphenoprop 600, SEE Diphenoprop, Turboprop), Caliber, 2,4-DB, Embutox, Lontrel plus MCPA ester, Pardner, Partner plus Decis, Thumper, Prestige.

   Mixing restrictions: Not compatible with sulfonyluxens and amine formulations of 2,4-D or MCPA. Tank mixing with other Broadleaf herbicides may lead to poor weed control and/or unacceptable crop injury.

   Mixing instructions: Recommended mixing order: Achieve 80DG, followed by tank mix partner. Always add Turbocharge adjuvant last.

3. **Crops:** All spring wheat, including durum (8.9), winter wheat (8.9), all 2 and 6 row barley varieties (8.9), fall rye, timothy (grown for hay or seed production), triticale.

   Seed crops only: Bromegrass (smooth and meadow), fescue (creeping red), wheatgrass (crested, intermediate, northern, slender, western); when not tank mixed with a broadleaf herbicide.

   Underseeding: Alfalfa, birdsfoot trefoil, sainfoin or clovers, bromegrass (smooth and meadow), fescue (creeping red), wheatgrass (crested, intermediate, northern, slender, western); when not tank mixed with a broadleaf herbicide. Do not feed or graze forage crops in year of treatment.

4. **Weeds Controlled:** Oats [wild (8.3)]; foxtail, [green (8.3), yellow]; Persian darnel (8.0), barnyard grass (8.0).

5. **Weeds Suppressed:** None.

6. **When Used:**

   Cereals, forage grasses (except Timothy) and legumes (listed above): No restrictions.

   Timothy: 5 - 6 leaf stage of growth.

   Wild oats: 1 - 6 leaf stage of growth (up to emergence of third tiller), Zadok's growth stage of 11,20 to 14,22.

   Green foxtail: 1 - 5 leaf stage of growth (up to emergence of second tiller), Zadok's growth stage of 11,20 to 14,21.

   Persian darnel: 1 - 4 leaf stage of growth, Zadok's growth stage of 11 to 14.

   Barnyard grass: 1 - 4 leaf stage, Zadok's growth stage of 11 to 14.

   Note: For forage grasses only, apply Achieve 80DG for control of wild oats, green foxtail and Persian darnel prior to tillering of the weeds. Applications made after the weeds have tillered may result in unacceptable weed control due to poor crop competition compared to cereal crops.

7. **How to Apply:**

   With: Ground and aerial equipment.

   Aerial equipment: Do not apply if the wind is more than 13 km/h. This will avoid spray drift onto non-target areas. **Do not apply within 50 m of non crop areas.** This includes fish-bearing waters, wetlands (potholes, sloughs, etc.) and wildlife habitat (hedgerows, rights of way, etc.). **Do not** spray Achieve 80DG if tame oats are present in adjacent, downwind fields.

   Nozzles: Flat fan type. 50 mesh or larger screens.

   Pressure: 275 kPa (ground), 137 - 275 kPa (aerial).

   Rate: 100 g/ac.

   Surfactant: 0.5% v/v or 1 L/200 L of spray solution.

   Water volume: Ground: 22 - 45 L/ac. Air: 12 - 20 L/ac.

Achieve 80DG (cont'd)

Mixing instructions:

1. Only use sprayers in good running condition with high agitation. Prior to application, ensure the sprayer is properly cleaned according to instructions on the product label.
2. Add 3/4 required amount of water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Do not enlarge the opening of the carton. Remove strainer screen from filler opening of spray tank. Add product slowly. (Note: Achieve 80DG must be added directly into the sprayer through the tank opening and not through injector of hopper systems for sprayers so equipped). For shallow spray tanks where water depth is 60 cm (24 inches) or less, add chemical towards agitator unit and away from outlet in the bottom of the tank to enhance dispersion. If more than one case of product is to be used, add Achieve 80DG from all cases first prior to adding tank mix partners or Turbocharge adjuvant.
3. Wait at least one minute after the last of the product has been added to the tank, allowing for complete dispersion of the granules. A longer agitation period may be required to disperse chemical when using cold water (less than 5°C) from sources such as deep drilled wells.
4. If tank mixing, add the recommended pesticide(s) next.
5. Lastly, add Turbocharge adjuvant, and then continue to fill the tank to the desired level with water.
6. Always insure the agitator is running until spraying is completed, even if stopping for brief periods. If agitation is stopped for more that 5 minutes, re-suspend spray solution by full agitation prior to respraying.

Note: Achieve 80DG must be sprayed within the same day of mixing.

8. **Application Tips:** Under conditions such as drought, heat, lack of fertility, flooding or prolonged cool temperatures, weed control may be reduced or delayed. Weed escapes or retillering may occur when application is made under prolonged stress conditions. Optimum weed control will be obtained if application is delayed until the stress conditions have ended, and weeds are once again actively growing. Tillered cereal crops may incur injury if applications are made within 48 hours of freezing temperatures. Non-tillering cereal crops that are exposed to temperatures of 4°C or less, up to 48 hours before or after application, may incur injury. Tank mixing Achieve 80DG with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from Achieve 80DG. Optimum weed control and crop yield occur when annual grasses are sprayed before tillering, with good spray coverage.

   Sequential applications: Always apply Achieve 80DG first and allow 5 - 7 days before applying any other non-registered tank mix herbicide.

9. **How it Works:** Achieve 80DG is systemic and readily translocates from leaf surface to the meristematic regions where it starts killing the grasses. Thorough coverage of the foliage is important for consistent grass control.
10. **Expected Results:** Grass growth stops in 48 hours. Young shoots turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks.
11. **Effects of Rainfall:** No effect 1 hour after application.
12. **Movement in Soil:** No soil movement. This product will not leach in the soil.
13. **Grazing and Cropping Restrictions:** Immature cereal crops may be grazed or cut for hay 16 days after treatment. Timothy may be harvested or cut for hay 16 days after treatment. Grain may be harvested 60 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment.

    Succeeding crops: No restrictions.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = >5,000. Treat symptomatically for ingestion and/or skin and eye contact. Avoid respiratory depressants unless otherwise indicated.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before use. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place. Keep packages dry at all times. Product is not affected by freezing.

Achieve Extra Gold

(tralkoxydim + bromoxynil + MCPA)

Group 1,4,6

WARNING POISON

Manufacturer **Zeneca Agro**

1. **Formulations:**
   1. Achieve 40DG: tralkoxydim; dispersible grain; 40%; 2 x 2 kg carton.
   2. Buctril M: 280g/L bromoxynil + 280 g/L MCPA; emulsifiable concentrate; 8 L jug.
   3. Turbocharge: Adjuvant; 4 L jug.

2. **Registered Mixes:** MCPA ester, Decis.

   Mixing instructions: Recommended mixing order: Achieve 40DG, followed by Buctril M and tank mix. Always add Turbocharge adjuvant last.

3. **Crops:** All spring wheat, including durum (8.9), winter wheat (8.9), all 2 and 6 row barley varieties (8.9), fall rye.

4. **Weeds Controlled:**

   American nightshade
   ball mustard
   barnyard grass (8.0)
   bluebur
   cocklebur
   common buckwheat
   common groundsel
   common ragweed
   cow cockle (7.8)
   flixweed (5.7)
   green foxtail (8.3)
   green smartweed
   kochia (6.7)
   lady's-thumb
   lamb's-quarters (8.6)
   night-flowering catchfly (7.8)
   pale smartweed (8.2)
   Persian darnel (8.0)
   redroot pigweed (7.9)
   Russian thistle (7.1)
   scentless chamomile (7.2)
   shepherd's-purse (6.0)
   stinkweed (8.9)
   tartary buckwheat (8.5)
   volunteer rapeseed (8.7)
   volunteer sunflower
   wild oats (8.3)
   wild buckwheat (8.1)
   wild mustard (8.4)
   wild tomato
   wormseed mustard
   yellow foxtail

5. **Weeds Suppressed:** Canada thistle (4.9) and perennial sow-thistle.

6. **When Used:**

   Cereals: 2 leaf to early flag leaf.

   Wild oats: 1 - 6 leaf stage of growth (up to emergence of third tiller), Zadoks growth stage of 11,20 to 14,22.

   Green foxtail: 1 - 5 leaf stage of growth (up to emergence of second tiller), Zadoks growth stage of 11,20 to 14,21.

   Persian darnel: 1 - 4 leaf stage of growth, Zadok's growth stage of 11 to 14.

   Barnyard grass: 1 - 4 leaf stage, Zadok's growth stage of 11 to 14.

   Broadleaf weeds: Up to 4 leaf stage. Buckwheats, groundsel, lamb's-quarters, mustards (wild, wormseed), ragweed, stinkweed up to 8 leaf stage.

7. **How to Apply:**

   With: Ground and aerial equipment.

   Aerial equipment: Do not apply Achieve Extra Gold if the wind is more than 13 km/h. This will avoid spray drift onto non-target areas. **Do not apply within 50 m of non crop areas.** This includes fish-bearing waters, wetlands (potholes, sloughs, etc.) and wildlife habitat (hedgerows, rights of way, etc.). **Do not** spray Achieve Extra Gold if tame oats are present in adjacent, downwind fields.

   Nozzles: Flat fan type. 50 mesh or larger screens.

   Pressure: 275 kPa (ground), 137 - 275 kPa (aerial).

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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Achieve Extra Gold (cont'd)

Rate:

Achieve Extra Gold	22 - 45 (Ground)	200 g/ac	400 mL/ac	0.50% v/v or 1 L/200 L
	12 - 20 (Aerial)			

Mixing instructions:

1. Only use sprayers with high agitation. Ensure the sprayer is properly cleaned prior to applying Achieve Extra Gold.
2. Add 3/4 required amount of water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Do not enlarge the opening of the Achieve 40DG carton. Remove strainer screen from filler opening of spray tank. Add Achieve 40DG slowly. (Note: Achieve 40DG must be added directly into the sprayer through the tank opening and not through injector or hopper systems.) For shallow spray tanks where water depth is 60 cm (24 inches) or less, add Achieve 40DG towards agitator unit and away from outlet in the bottom of the tank to enhance dispersion. If more than one case of Achieve Extra Gold is used, add Achieve 40DG from all cases first prior to adding Buctril M and other tank mix partners. Add Tubercharge adjuvant.
3. Wait at least one minute after the last of the Achieve 40DG has been added to the tank to allow for complete dispersion of the granules. A longer agitation period may be required to disperse Achieve 40DG when using cold water (less than 5°C) from sources such as deep drilled wells.
4. Add the correct amount of Buctril M and tank mix partner.
5. Lastly, add Turbocharge adjuvant, and then continue to fill tank to desired level with water.
6. Always ensure the agitator is running until spraying is completed, even if stopping for brief periods. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to respraying.

Note: Achieve Extra Gold must be sprayed within the same day of mixing.

8. **Application Tips:** Under conditions such as drought, heat, lack of fertility, flooding or prolonged cool temperatures, weed control may be reduced or delayed. Weed escapes or retillering may occur when application is made under prolonged stress conditions. Optimum weed control will be obtained if application of Achieve Extra Gold is delayed until the stress conditions have ended, and weeds are once again actively growing. Tillered cereal crops may incur injury if applications are made within 48 hours of freezing temperatures. Non-tillering cereal crops that are exposed to temperatures of 4°C or less, up to 48 hours before or after application, may incur injury. Tank mixing Achieve Extra with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from Achieve Extra. Optimum weed control and crop yield response occurs when annual grasses are sprayed before tillering and broadleaf weeds are sprayed in seedling stage, with good spray coverage.
9. **How it Works: Achieve 40DG/80DG** is systemic and readily translocates from leaf surface to the meristematic regions where it starts killing the grasses. Thorough coverage of the foliage is important for consistent grass control. **Bromoxynil** is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. **MCPA** is absorbed through leaves and is readily translocated in the plant.
10. **Expected Results:** Grassy Weeds: growth stops in 48 hours. Young shoots turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks. Broadleaf weeds: small burnt spots on the leaf can appear within hours, death takes up to two weeks. **Poor results may be expected** as a result of poor coverage or poor penetration through canopy.
11. **Effects of Rainfall:** No effect 1 hour after application.
12. **Movement in Soil:** Achieve 40DG/80DG: no soil movement. This product will not leach in the soil. Buctril M: Readily leached from the soil. Longer residual in dry soil.

Achieve Extra Gold (cont'd)

Rate:

Product	Water volume (L/acre)	[illegible]		Adjuvant rate
		Achieve 40DG	Buctril M	Turbocharge
Achieve Extra Gold	22 - 45 (Ground)	200 g/ac	400 mL/ac	0.50% v/v or 1 L/200 L
	12 - 20 (Aerial)			

Mixing instructions:

1. Only use sprayers with high agitation. Ensure the sprayer is properly cleaned prior to applying Achieve Extra Gold.
2. Add 3/4 required amount of water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Do not enlarge the opening of the Achieve 40DG carton. Remove strainer screen from filler opening of spray tank. Add Achieve 40DG slowly. (Note: Achieve 40DG must be added directly into the sprayer through the tank opening and not through injector or hopper systems.) For shallow spray tanks where water depth is 60 cm (24 inches) or less, add Achieve 40DG towards agitator unit and away from outlet in the bottom of the tank to enhance dispersion. If more than one case of Achieve Extra Gold is used, add Achieve 40DG from all cases first prior to adding Buctril M and other tank mix partners. Add Tubercharge adjuvant.
3. Wait at least one minute after the last of the Achieve 40DG has been added to the tank to allow for complete dispersion of the granules. A longer agitation period may be required to disperse Achieve 40DG when using cold water (less than 5 C) from sources such as deep drilled wells.
4. Add the correct amount of Buctril M and tank mix partner.
5. Lastly, add Turbocharge adjuvant, and then continue to fill tank to desired level with water.
6. Always ensure the agitator is running until spraying is completed, even if stopping for brief periods. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to respraying.

Note: Achieve Extra Gold must be sprayed within the same day of mixing.

8. **Application Tips:** Under conditions such as drought, heat, lack of fertility, flooding or prolonged cool temperatures, weed control may be reduced or delayed. Weed escapes or retillering may occur when application is made under prolonged stress conditions. Optimum weed control will be obtained if application of Achieve Extra Gold is delayed until the stress conditions have ended, and weeds are once again actively growing. Tillered cereal crops may incur injury if applications are made within 48 hours of freezing temperatures. Non-tillering cereal crops that are exposed to temperatures of 4 C or less, up to 48 hours before or after application, may incur injury. Tank mixing Achieve Extra with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from Achieve Extra. Optimum weed control and crop yield response occurs when annual grasses are sprayed before tillering and broadleaf weeds are sprayed in seedling stage, with good spray coverage.

9. **How it Works: Achieve 40DG/80DG** is systemic and readily translocates from leaf surface to the meristematic regions where it starts killing the grasses. Thorough coverage of the foliage is important for consistent grass control. **Bromoxynil** is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. **MCPA** is absorbed through leaves and is readily translocated in the plant.

10. **Expected Results:** Grassy Weeds: growth stops in 48 hours. Young shoots turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks. Broadleaf weeds: small burnt spots on the leaf can appear within hours, death takes up to two weeks. **Poor results may be expected** as a result of poor coverage or poor penetration through canopy.

11. **Effects of Rainfall:** No effect 1 hour after application.

12. **Movement in Soil:** Achieve 40DG/80DG: no soil movement. This product will not leach in the soil. Buctril M: Readily leached from the soil. Longer residual in dry soil.

13. **Grazing and Cropping Restrictions:** Immature crops may be grazed or cut for hay 30 days after treatment. Grain may be harvested 60 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment.

    Succeeding crops: No restrictions.

14. **Toxicity:** Tralkoxydim: very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 5,000. Treat symptomatically for ingestion and/or skin and eye contact. Avoid respiratory depressants unless otherwise indicated. Bromoxynil/MCPA: High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (365). Very toxic to birds and fish. Non toxic to bees. May cause burns and may be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before use. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place. Keep package dry at all times. Product is not affected by freezing.

Advance 10G *(trifluralin)*

(oilseeds, special crops, barley and wheat)

Group 3

Manufacturer: **Dow AgroSciences Canada Inc.**

1. **Formulations:** Granular; trifluralin 10.0%; 22.7 kg bag, 454 kg bulk bag.
2. **Registered Mixes:** None.
3. **Crops:** Alfalfa (establishment), canola (rapeseed) (including triazine tolerant) (8.9), dry beans, flax (7.7), lentils (8.5), mustard (8.9), peas (canning, field) (8.9), sunflowers (8.9), fababeans (8.6).
   Special use: barley, wheat.

   Underseeding: Not recommended.

4. **Weeds Controlled:**
   - annual bluegrass (8.6)
   - barnyard grass (8.3)
   - chickweed (7.1)
   - cow cockle (9.0)
   - downy bromegrass (5.9)
   - green foxtail
   - knotweed
   - lamb's-quarters (8.0)
   - Persian darnel
   - pigweed (8.2)
   - purslane (7.9)
   - wild buckwheat (8.3)
   - wild oats (7.5)
   - yellow foxtail (8.1)
5. **Weeds Suppressed:** None.
6. **When Used:**

   Spring: Not recommended.

   Summer: Canola (including triazine tolerant), flax. On summerfallow between June 1 and September 1.

   Fall: Alfalfa establishment, canola (including triazine tolerant), dry beans, fababeans, flax, lentils, mustard, peas, soybeans, sunflowers. Between September 1 and soil freeze-up.

Advance 10G (cont'd)

7. **How to Apply**:

With: Ground equipment.

Rate:

[illegible]	[illegible]	[illegible]	[illegible]
Summer		Sand – sandy loam	NR**
		Silts to loams to clays	6.9 kg/ac
Fall	2 - 6%	Sand – sandy loam	4.4 kg/ac
	2 - 6%	Silts to loams to clays	5.7 kg/ac
Fall	6 - 15%	Sand – sandy loam	5.7 kg/ac
	6 - 15%	Silts to loams to clays	5.7 - 6.9 kg/ac*

* Higher rate for heavy wild oat population.
** Not recommended.

Incorporation: First incorporation must be done within 24 hours of application. Second, at right angles to the first, should be delayed a **minimum** of 3 days. This delay allows for greater release and more uniform distribution of trifluralin in the soil.

Fall application: Both incorporations should be completed in the fall.

Summer application: The second (and subsequent incorporations) can be done as necessary to destroy resistant weed growth.

Flax, lentils: Both incorporations must be done in the fall. Fall or summer application should be followed by a spring tillage to a 5 - 8 cm depth before seeding.

Implements: A tandem disc, discer or field cultivator (Vibrashank) set to cut 5 - 8 cm deep is required.

8. **Application Tips:** Do not apply on soils that are wet, in poor tilth or contain 15% or more organic matter. Do not apply to fields spread with manure during the past 12 months. Ensure that after this period, manure has been thoroughly disintegrated and mixed into the soil. Ensure that large clods are broken down prior to application. Do not apply on soils that are subjected to prolonged periods of flooding. Do not apply on soils with less than 2% organic matter. Application on eroded knolls may result in reduced crop stand or rotational crop injury. If the swath from the previous crop was removed by burning, cultivate once to remove charcoal layer prior to application of Advance 10G. Advance 10G can be used where trash is heavier or on standing weeds provided that they do not interfere with distribution of the granule on the soil and do not limit incorporation by plugging the incorporation equipment. To avoid concentrating wild oat seeds below the treated layer, do not plow land prior to application of Advance 10G.

   Flax, lentils: Shallowly till and pack the soil in spring to ensure a firm seedbed and accurate depth of seeding. Seed into a well-packed, warm moist seedbed. Do not seed deeper than 4 cm.

9. **How it Works:** Kills weed seedlings as they germinate. Inhibits cell division in the actively growing points of root and shoot.

10. **Expected Results:**

    Weeds: Most weeds die before emerging. Weeds will exhibit swelling in the coleoptile region, stubby, thick primary root development and lack of secondary roots, which leads to death due to inadequate moisture obtaining ability.

11. **Effects of Rainfall:** No effect once trifluralin is incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use. Normally, Advance 10G carry over will not harm crops grown in rotation. As a precaution, oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not follow an Advance 10G treated crop. Drought conditions in the year of treatment may result in higher levels of trifluralin carry over into the next year. To avoid wheat injury, seed less than 7 cm deep into a warm, moist seedbed using recommended agronomic practices that will promote rapid even germination of the crop. Avoid direct seeding (zero till) and seeding into loose seedbeds. Refer to industry or government extension documents that outline the best seeding practice for each crop. As a precaution, do not seed wheat as a rotational crop on land that has received ethalfluralin or trifluralin at oilseed/special crop/barley rate for two consecutive years. Over-application caused by overlapping, improper calibration or non-uniform application may reduce the stand of treated crops or crops grown in rotation.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (10,000). In clean water, fish are very sensitive to trifluralin, but in runoff or muddy water, trifluralin binds to soil particles and large amounts can be tolerated by fish. Non-toxic to bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Do not store under direct sunlight. Do not store in granular applicator (24 hours maximum).
17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Heritage, Rival, Bonanza 10G/400 and Fortress) will not control trifluralin tolerant green foxtail. To delay selection or reduce the spread of trifluralin tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin tolerant green foxtail.

Special use Advance 10G: Barley: fall application only (September 1 to soil freeze-up).

Weeds controlled: Refer to Section 4 (above).

Incorporation: Refer to Section 7 (above).

Rate:

	Advance 10G kg/ha	
Organic matter	Sand – sandy loam	Silt to loam to clay
2 - 4%	3.4	4.4
4 - 6%	4.4	5.7

Warning: Do not apply on soils with less than 2% organic matter or on deep black soil with more than 6% organic matter. Do not apply on land treated with products containing trifluralin since June 1 of the previous year. Application to severely eroded knolls may result in reduced crop stand. Using press or hoe drill, seed 5 cm deep into a moist, warm seedbed. Avoid seeding into very cold soil. Seedling diseases, cold weather, improper seeding depth, excessive moisture, high salt concentration or drought may weaken crop seedlings and increase the possibility of damage from Advance 10G.

Special use Advance 10G: Wheat (includes semidwarf and durum): fall application only (September 1 to soil freeze-up).

Weeds controlled: Green foxtail.

Advance 10G (cont'd)

7. **How to Apply:**

With: Ground equipment.

Rate:

Season	Organic matter	Soil texture	Advance 10G
Summer		Sand – sandy loam	NR**
		Silts to loams to clays	6.9 kg/ac
Fall	2 - 6%	Sand – sandy loam	4.4 kg/ac
	2 - 6%	Silts to loams to clays	5.7 kg/ac
Fall	6 - 15%	Sand – sandy loam	5.7 kg/ac
	6 - 15%	Silts to loams to clays	5.7 - 6.9 kg/ac*

* Higher rate for heavy wild oat population.

** Not recommended.

Incorporation: First incorporation must be done within 24 hours of application. Second, at right angles to the first, should be delayed a **minimum** of 3 days. This delay allows for greater release and more uniform distribution of trifluralin in the soil.

Fall application: Both incorporations should be completed in the fall.

Summer application: The second (and subsequent incorporations) can be done as necessary to destroy resistant weed growth.

Flax, lentils: Both incorporations must be done in the fall. Fall or summer application should be followed by a spring tillage to a 5 - 8 cm depth before seeding.

Implements: A tandem disc, discer or field cultivator (Vibrashank) set to cut 5 - 8 cm deep is required.

8. **Application Tips:** Do not apply on soils that are wet, in poor tilth or contain 15% or more organic matter. Do not apply to fields spread with manure during the past 12 months. Ensure that after this period, manure has been thoroughly disintegrated and mixed into the soil. Ensure that large clods are broken down prior to application. Do not apply on soils that are subjected to prolonged periods of flooding. Do not apply on soils with less than 2% organic matter. Application on eroded knolls may result in reduced crop stand or rotational crop injury. If the swath from the previous crop was removed by burning, cultivate once to remove charcoal layer prior to application of Advance 10G. Advance 10G can be used where trash is heavier or on standing weeds provided that they do not interfere with distribution of the granule on the soil and do not limit incorporation by plugging the incorporation equipment. To avoid concentrating wild oat seeds below the treated layer, do not plow land prior to application of Advance 10G.

Flax, lentils: Shallowly till and pack the soil in spring to ensure a firm seedbed and accurate depth of seeding. Seed into a well-packed, warm moist seedbed. Do not seed deeper than 4 cm.

9. **How it Works:** Kills weed seedlings as they germinate. Inhibits cell division in the actively growing points of root and shoot.

10. **Expected Results:**

Weeds: Most weeds die before emerging. Weeds will exhibit swelling in the coleoptile region, stubby, thick primary root development and lack of secondary roots, which leads to death due to inadequate moisture obtaining ability.

11. **Effects of Rainfall:** No effect once trifluralin is incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use. Normally, Advance 10G carry over will not harm crops grown in rotation. As a precaution, oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not follow an Advance 10G treated crop. Drought conditions in the year of treatment may result in higher levels of trifluralin carry over into the next year. To avoid wheat injury, seed less than 7 cm deep into a warm, moist seedbed using recommended agronomic practices that will promote rapid even germination of the crop. Avoid direct seeding (zero till) and seeding into loose seedbeds. Refer to industry or government extension documents that outline the best seeding practice for each crop. As a precaution, do not seed wheat as a rotational crop on land that has received ethalfluralin or trifluralin at oilseed/special crop/barley rate for two consecutive years. Over-application caused by overlapping, improper calibration or non-uniform application may reduce the stand of treated crops or crops grown in rotation.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (10,000). in clean water, fish are very sensitive to trifluralin, but in runoff or muddy water, trifluralin binds to soil particles and large amounts can be tolerated by fish. Non-toxic to bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Do not store under direct sunlight. Do not store in granular applicator (24 hours maximum).
17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Heritage, Rival, Bonanza 10G/400 and Fortress) will not control trifluralin tolerant green foxtail. To delay selection or reduce the spread of trifluralin tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin tolerant green foxtail.

Special use Advance 10G: Barley: fall application only (September 1 to soil freeze-up).

Weeds controlled: Refer to Section 4 (above).

Incorporation: Refer to Section 7 (above).

Rate:

	Advance 10G kg/ac	
Organic matter	**Sand – sandy loam**	**Silt to loam to clay**
2 - 4%	3.4	4.4
4 - 6%	4.4	5.7

Warning: Do not apply on soils with less than 2% organic matter or on deep black soil with more than 6% organic matter. Do not apply on land treated with products containing trifluralin since June 1 of the previous year. Application to severely eroded knolls may result in reduced crop stand. Using press or hoe drill, seed 5 cm deep into a moist, warm seedbed. Avoid seeding into very cold soil. Seedling diseases, cold weather, improper seeding depth, excessive moisture, high salt concentration or drought may weaken crop seedlings and increase the possibility of damage from Advance 10G.

Special use Advance 10G: Wheat (includes semidwarf and durum): fall application only (September 1 to soil freeze-up).

Weeds controlled: Green foxtail.

Advance 10G (cont'd)

Incorporation: Incorporate within 24 hours of application using field cultivator or disc operated at 8 - 10 km/hr and set to work 5 - 8 cm deep. The second working should be done at the same depth and at right angles to the first. If workings are done in the fall, a **mimimum** delay of 3 days between incorporations is required. All spring tillage following fall application of Advance 10G should be done when the soil is warm enough to promote germination.

Rate: 2.2 kg/ac (soils between 2% and 8% organic matter).

Warning: Use good quality certified seed. Application to severely eroded knolls may result in reduced crop stand. 2.2 kg/ac is the maximum use rate on wheat. Higher rates may result in crop injury.

Afolan F *(linuron)*

Group 7

Manufacturer: **Aventis Crop Science**

1. **Formulations:** Liquid Flowable; 480 g/L; 10 L jug.
2. **Registered Mixes:** Dual 960 E, MCPA Amine 500.

   Mixing restrictions: Use only MCPA amine to avoid crop injury. Avoid very hard water with MCPA mix. Ensure adequate agitation. Use soon after mixing.
3. **Crops:**

Afolan F

- asparagus (8.7)
- caraway****
- carrots (8.2)
- celery (9.0)
- coriander****
- corn [field, sweet*) (6.5)]
- dill (7.2)
- fruit trees**
- parsnips (7.0)
- potatoes (8.7)
- shelterbelts*** (9.0)

Afolan F + MCPA Amine

- barley (8.6)
- oats (8.9)
- wheat, spring (8.2)

* Only on gold crest, marcross, merit, preview, seneca explorer, seneca golden, seneca 60, sugar kin

** Apple, cherry, peach, pear, plum, prune-plum.

*** Ash (green), caragana, elm (American, Siberian), maple (Manitoba), pine (Scotch, at least 2 years old), poplar, spruce (Colorado, white; at least 2 years old), willow.

**** Wild mustard control in cotyledon to 4 leaf stage.

4. Weeds Controlled:

Afolan F

annual smartweed (9.0)
barnyard grass (8.3)
common chickweed (9.0)
common ragweed
corn spurry (8.7)
fall panicum
goosefoot (8.4)
groundsel (8.6)
knotweed
kochia ([illegible].4)
lamb's-quarters (7.9)
perennial seedling sow-thistle
prostrate pigweed (8.7)
purslane (8.4)
redroot pigweed (7.9)
seedling dandelion (6.0)
seedling plantain
shepherd's-purse (9.0)
stinkweed (8.5)
wild buckwheat (8.5)
wild radish
wormseed mustard (6.0)
yellow foxtail (6.2)

Afolan F + MCPA Amine

annual smartweed (7.0)
ball mustard
cocklebur
common burdock
common chickweed (7.4)
common ragweed
cow cockle
giant ragweed (9.0)
goat's-beard
hare's-ear mustard
hemp-nettle (7.5)
Indian mustard
kochia (5.8)
lady's-thumb
lamb's-quarters (8.9)
prickly lettuce
prostrate pigweed (8.0)
redroot pigweed (7.8)
Russian pigweed
shepherd's-purse
sow-thistle
stinkweed (8.9)
stork's-bill (8.2)
tartary buckwheat (7.9)
tumble mustard
wild buckwheat (7.5)
wild mustard
wild radish
wormseed mustard (8.8)

5. Weeds Suppressed: Green foxtail (6.7), field horsetail.

6. When Used:

Afolan F

Asparagus, potatoes: Pre-emergent.
Carrots, parsnips, dill: 2 or more leaves; before grassy weeds 5 cm tall, broadleaf weeds 15 cm.
Celery transplants: As soon as new growth starts.
Coriander, caraway: 2 - 4 leaf stage.
Corn (field, sweet): Before corn emerges or as a directed spray on weeds after corn is at least 38 cm tall.
Fruit trees: Directed spray around trunk of trees established at least 10 years, peaches 1 year.
Shelterbelts: Before or immediately after weeds emerge, before 15 cm tall, no earlier than 10 days after transplanting. After buds open, apply as a directed spray. Keep chemical off the leaves. Pine and spruce must be at least 2 years old.

Afolan F + MCPA Amine

Barley, oats, wheat (spring): When crop in 2 - 4 leaf; weeds in 1 - 4 leaf. Do not apply after tillering.

7. How to Apply:

With: Ground equipment.

Application method:

Afolan F: 80 - 160 L water/ac except on shelterbelts and fruit trees: directed spray required.

Afolan F + MCPA Amine: 40 L/ac water: 275 kPa – 9 km/h. Screens 50 mesh or larger – 80° flat fan nozzles – adequate agitation required.

Advance 10G (cont'd)

Incorporation: Incorporate within 24 hours of application using field cultivator or disc operated at 8 - 10 km/hr and set to work 5 - 8 cm deep. The second working should be done at the same depth and at right angles to the first. If workings are done in the fall, a **mimimum** delay of 3 days between incorporations is required. All spring tillage following fall application of Advance 10G should be done when the soil is warm enough to promote germination.

Rate: 2.2 kg/ac (soils between 2% and 8% organic matter).

Warning: Use good quality certified seed. Application to severely eroded knolls may result in reduced crop stand. 2.2 kg/ac is the maximum use rate on wheat. Higher rates may result in crop injury.

Afolan F *(linuron)*

Group 7

Manufacturer: **Aventis Crop Science**

1. **Formulations:** Liquid Flowable; 480 g/L; 10 L jug.
2. **Registered Mixes:** Dual 960 E, MCPA Amine 500.

   Mixing restrictions: Use only MCPA amine to avoid crop injury. Avoid very hard water with MCPA mix. Ensure adequate agitation. Use soon after mixing.
3. **Crops:**

			[illegible]
asparagus (8.7)	coriander****	parsnips (7.0)	barley (8.6)
caraway****	corn [field, sweet*) (6.5)]	potatoes (8.7)	oats (8.9)
carrots (8.2)	dill (7.2)	shelterbelts*** (9.0)	wheat, spring (8.2)
celery (9.0)	fruit trees**		

* Only on gold crest, marcross, merit, preview, seneca explorer, seneca golden, seneca 60, sugar king.

** Apple, cherry, peach, pear, plum, prune-plum.

*** Ash (green), caragana, elm (American, Siberian), maple (Manitoba), pine (Scotch, at least 2 years old), poplar, spruce (Colorado, white; at least 2 years old), willow.

**** Wild mustard control in cotyledon to 4 leaf stage.

4. Weeds Controlled:

[illegible]

annual smartweed (9.0)
barnyard grass (8.3)
common chickweed (9.0)
common ragweed
corn spurry (8.7)
fall panicum
goosefoot (8.4)
groundsel (8.6)
knotweed
kochia (6.4)
lamb's-quarters (7.9)
perennial seedling sow-thistle
prostrate pigweed (8.7)
purslane (8.4)
redroot pigweed (7.9)
seedling dandelion (6.0)
seedling plantain
shepherd's-purse (9.0)
stinkweed (8.5)
wild buckwheat (8.5)
wild radish
wormseed mustard (6.0)
yellow foxtail (6.2)

[illegible]

annual smartweed (7.0)
ball mustard
cocklebur
common burdock
common chickweed (7.4)
common ragweed
cow cockle
giant ragweed (9.0)
goat's-beard
hare's-ear mustard
hemp-nettle (7.5)
Indian mustard
kochia (5.8)
lady's-thumb
lamb's-quarters (8.9)
prickly lettuce
prostrate pigweed (8.0)
redroot pigweed (7.8)
Russian pigweed
shepherd's-purse
sow-thistle
stinkweed (8.9)
stork's-bill (8.2)
tartary buckwheat (7.9)
tumble mustard
wild buckwheat (7.5)
wild mustard
wild radish
wormseed mustard (8.8)

5. Weeds Suppressed: Green foxtail (6.7), field horsetail.

6. When Used:

Afolan F
Asparagus, potatoes: Pre-emergent.
Carrots, parsnips, dill: 2 or more leaves; before grassy weeds 5 cm tall, broadleaf weeds 15 cm.
Celery transplants: As soon as new growth starts.
Coriander, caraway: 2 - 4 leaf stage.
Corn (field, sweet): Before corn emerges or as a directed spray on weeds after corn is at least 38 cm tall.
Fruit trees: Directed spray around trunk of trees established at least 10 years, peaches 1 year.
Shelterbelts: Before or immediately after weeds emerge, before 15 cm tall, no earlier than 10 days after transplanting. After buds open, apply as a directed spray. Keep chemical off the leaves. Pine and spruce must be at least 2 years old.

Afolan F + MCPA Amine
Barley, oats, wheat (spring): When crop in 2 - 4 leaf; weeds in 1 - 4 leaf. Do not apply after tillering.

7. How to Apply:

With: Ground equipment.

Application method:

Afolan F: 80 - 160 L water/ac except on shelterbelts and fruit trees: directed spray required.

Afolan F + MCPA Amine: 40 L/ac water: 275 kPa – 9 km/h. Screens 50 mesh or larger – 80° flat fan nozzles – adequate agitation required.

M121

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Afolan F (cont'd)

Rate: Barley, oats, wheat (spring): Afolan F 190 - 240 mL/ac + MCPA Amine 445 mL/ac.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Asparagus	1.9	1.4	Corn (pre)	1.5 - 1.9*	1.01 - 1.52*
Carrots, dill, parsnip (pre)	0.77 - 1.01	0.53 - 0.77	Corn (post)	1.01 - 1.52*	1.01 - 1.52*
Carrots, dill, parsnip (post)	0.77 - 1.9	0.77 - 1.9	Fruit trees	3.8	3.8
Carrots, dill, parsnip (pre + post)	0.53 - 0.77, then	0.77 - 1.0	Potatoes (pre)	1.5 - 1.9	1.01 - 1.52
			Potatoes (pre)	0.9 + 1.11 L/ac Dual 960 E	0.72 + 0.81 L/ac Dual 960 E
Celery (post)	0.77 - 1.9	0.53 - 0.77	Shelterbelts	1.9 - 3.8	1.9 - 3.8
Coriander, caraway	0.51 - 0.67	0.51 - 0.67			

* Use lower rate when weeds do not exceed 5 cm.

8. **Application Tips:** Early application will avoid crop injury. Barley may suffer growth suppression, maturity delay and yield reduction that may be offset by control of heavy weed growth. Make only 1 Afolan F application per crop year. Do not apply to crops under drought, heat or frost stress.
9. **How it Works:** Afolan F: both systemic and contact, absorbed by roots and leaves. MCPA: systemic, absorbed by leaves.
10. **Expected Results:** First, browning of older leaf tips; then water soaked, wilted appearance; progressive yellowing; stem collapse; browning and death. MCPA promotes stem bending, twisting and leaf cupping. **Poor results may be expected if** incorrect timing of application, stress conditions, crusted soil or rain immediately after spraying.
11. **Effects of Rainfall:** Requires rainfall or irrigation for activation of pre-emergent applications. Rainfall within 1 hour may decrease post-emergent effect. Unusually heavy rains after a pre-emergent application may cause severe injury to corn, carrots, or parsnips.

    Afolan F + MCPA Amine: Rainfall within 4 hours will detract from results.
12. **Movement in Soil:** Higher rates of Afolan F and extreme moisture may cause some leaching.
13. **Grazing and Cropping Restrictions:** Do not graze or feed green plants to livestock. Do not apply within 60 days of harvest. No restriction on succeeding crops except if 2.0 L/ac or more is applied (possible 25% carry over to next season).
14. **Toxicity:** Very low mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (4,000). May irritate eyes, skin, nose and throat. Toxic to fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Do not store below 5°C. If stored for 1 year or longer, shake well before using.

    Note: Similar products Lorox and Linuron 480 are also listed.

Ally *(metsulfuron methyl)*

Group 2

Manufacturer: **DuPont Canada Inc.**

CAUTION POISON

1. **Formulations:** Dry Flowable; 60%; Toss-N-Go 122 g (4 x 30.5 g) water soluble pouches.

2. **Registered Mixes:** Assure II (200 - 400 mL/ac + surfactant); Avenge 200-C (1.7 L/ac, no surfactant); Avenge 200-C + MCPA ester (1.7 L/ac + 280 - 400 mL/ac, no surfactant); 2,4-D Amine 500 (340 - 450 mL/ac + surfactant); MCPA Amine and Ester 500 (280 - 450 mL/ac + surfactant); 2,4-D LV Ester 700 (240 - 320 mL/ac + surfactant); Avenge 200C (1.7 L/ac, do not use surfactant with this tank mixture); Puma (400 mL/ac, no surfactant); Puma Super (200 or 400 mL/ac, no surfactant), Horizon + Score surfactant (Refer to Horizon label for mixing instructions).

   Surfactants: Ag-Surf, Agral 90, Citowett Plus, Super Spreader-Sticker, Companion.

   Mixing instructions: Add 1/2 required amount of water. While agitating, add Ally and ensure it is completely suspended. Add second herbicide, if required. Complete filling, then add surfactant if required. Continuous agitation is required. If antifoam is needed, add it last.

3. **Crops:** Barley, wheat (durum, spring). Forage grasses for seed or feed: creeping red fescue, orchard grass, intermediate wheatgrass (estab.), crested wheatgrass (estab.).

   * Not recommended for underseeding with legumes or other grasses not listed.

4. **Weeds Controlled:**

Ally 3 g/ac (alone)

ball mustard
bluebur (7.8)
chickweed (8.9)
common groundsel (8.6)
corn spurry (8.1)
cow cockle (8.8)
flixweed (6.6)
green smartweed (7.2)
hemp-nettle (8.8)
kochia (8.0)
lady's-thumb (8.5)
narrow-leaved hawk's-beard
prostrate pigweed (7.3)
redroot pigweed
scentless chamomile (8.3)
shepherd's-purse (8.8)
stinkweed (8.8)
stork's-bill (7.7)
tartary buckwheat (8.3)
volunteer rapeseed (excluding smart-trait) (8.6)
wild mustard (8.8)

Ally 2 - 3 g/ac + MCPA

annual sunflower
ball mustard
bluebur*
chickweed (8.6)
common groundsel*
corn spurry*
cow cockle (8.7)
flixweed (7.6)
green smartweed (8.5)
hemp-nettle (8.5)
kochia (6.7)
lady's-thumb*
lamb's-quarters
plantain
prickly lettuce
prostrate pigweed*
redroot pigweed (8.0)
Russian pigweed
Russian thistle (8.0)
scentless chamomile*
shepherd's-purse (7.6)
stinkweed (8.6)
stork's-bill*
sweet clover
tartary buckwheat*
tumble mustard
volunteer rapeseed (including smart-trait) (8.6)
wild mustard (8.7)
wormseed mustard

Ally 2 - 3 g/ac + 2,4-D

annual sunflower
ball mustard
bluebur*
chickweed
common groundsel*
corn spurry*
cow cockle (8.6)
flixweed (9.0)
green smartweed (8.6)
hemp-nettle (8.4)
kochia (7.4)
lady's-thumb*
lamb's-quarters
narrow-leaved hawk's-beard (spring seedlings only)
plantain
prickly lettuce
prostrate pigweed*
redroot pigweed (8.3)
Russian pigweed
Russian thistle (7.7)
scentless chamomile*
shepherd's-purse (6.2)
stinkweed (8.2)
stork's-bill*
sweet clover
tartary buckwheat*
volunteer rapeseed (including smart-trait)
wild mustard (8.7)
wormseed mustard

* Weeds controlled only when mixtures contain Ally at 3 g/ac.

Afolan F (cont'd)

Rate: Barley, oats, wheat (spring): Afolan F 190 - 240 mL/ac + MCPA Amine 445 mL/ac.

	Afolan F (L/ac)				
Crop	**Muck or clay Medium O.M.**	**Loam or clay Low O.M.**	**Crop**	**Muck or clay Medium O.M.**	**Loam or clay Low O.M.**
Asparagus	1.9	1.4	Corn (pre)	1.5 - 1.9*	1.01 - 1.52*
Carrots, dill, parsnip (pre)	0.77 - 1.01	0.53 - 0.77	Corn (post)	1.01 - 1.52*	1.01 - 1.52*
Carrots, dill, parsnip (post)	0.77 - 1.9	0.77 - 1.9	Fruit trees	3.8	3.8
Carrots, dill, parsnip (pre + post)	0.53 - 0.77, then	0.77 - 1.0	Potatoes (pre)	1.5 - 1.9	1.01 - 1.52
			Potatoes (pre)	0.9 + 1.11 L/ac Dual 960 E	0.72 + 0.81 L/ac Dual 960 E
Celery (post)	0.77 - 1.9	0.53 - 0.77	Shelterbelts	1.9 - 3.8	1.9 - 3.8
Coriander, caraway	0.51 - 0.67	0.51 - 0.67			

* Use lower rate when weeds do not exceed 5 cm.

8. **Application Tips:** Early application will avoid crop injury. Barley may suffer growth suppression, maturity delay and yield reduction that may be offset by control of heavy weed growth. Make only 1 Afolan F application per crop year. Do not apply to crops under drought, heat or frost stress.

9. **How it Works:** Afolan F: both systemic and contact, absorbed by roots and leaves. MCPA: systemic, absorbed by leaves.

10. **Expected Results:** First, browning of older leaf tips; then water soaked, wilted appearance; progressive yellowing; stem collapse; browning and death. MCPA promotes stem bending, twisting and leaf cupping. **Poor results may be expected if** incorrect timing of application, stress conditions, crusted soil or rain immediately after spraying.

11. **Effects of Rainfall:** Requires rainfall or irrigation for activation of pre-emergent applications. Rainfall within 1 hour may decrease post-emergent effect. Unusually heavy rains after a pre-emergent application may cause severe injury to corn, carrots, or parsnips.

    Afolan F + MCPA Amine: Rainfall within 4 hours will detract from results.

12. **Movement in Soil:** Higher rates of Afolan F and extreme moisture may cause some leaching.

13. **Grazing and Cropping Restrictions:** Do not graze or feed green plants to livestock. Do not apply within 60 days of harvest. No restriction on succeeding crops except if 2.0 L/ac or more is applied (possible 25% carry over to next season).

14. **Toxicity:** Very low mammalian toxicity. Acute oral LD$_{50}$ (rats) (mg/kg) = technical (4,000). May irritate eyes, skin, nose and throat. Toxic to fish.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Do not store below 5°C. If stored for 1 year or longer, shake well before using.

    Note: Similar products Lorox and Linuron 480 are also listed.

Ally *(metsulfuron methyl)*

Group 2

Manufacturer: **DuPont Canada Inc.**

CAUTION POISON

1. **Formulations:** Dry Flowable; 60%; Toss-N-Go 122 g (4 x 30.5 g) water soluble pouches.
2. **Registered Mixes:** Assure II (200 - 400 mL/ac + surfactant); Avenge 200-C (1.7 L/ac, no surfactant); Avenge 200-C + MCPA ester (1.7 L/ac + 280 - 400 mL/ac, no surfactant); 2,4-D Amine 500 (340 - 450 mL/ac + surfactant); MCPA Amine and Ester 500 (280 - 450 mL/ac + surfactant); 2,4-D LV Ester 700 (240 - 320 mL/ac + surfactant); Avenge 200C (1.7 L/ac, do not use surfactant with this tank mixture); Puma (400 mL/ac, no surfactant); Puma Super (200 or 400 mL/ac, no surfactant), Horizon + Score surfactant (Refer to Horizon label for mixing instructions).

   Surfactants: Ag-Surf, Agral 90, Citowett Plus, Super Spreader-Sticker, Companion.

   Mixing instructions: Add 1/2 required amount of water. While agitating, add Ally and ensure it is completely suspended. Add second herbicide, if required. Complete filling, then add surfactant if required. Continuous agitation is required. If antifoam is needed, add it last.
3. **Crops:** Barley, wheat (durum, spring). Forage grasses for seed or feed: creeping red fescue, orchard grass, intermediate wheatgrass (estab.), crested wheatgrass (estab.).
   * Not recommended for underseeding with legumes or other grasses not listed.
4. **Weeds Controlled:**

Ally 3 g/ac (alone)

ball mustard
bluebur (7.8)
chickweed (8.9)
common groundsel (8.6)
corn spurry (8.1)
cow cockle (8.8)
flixweed (6.6)
green smartweed (7.2)
hemp-nettle (8.8)
kochia (8.0)
lady's-thumb (8.5)
narrow-leaved hawk's-beard
prostrate pigweed (7.3)
redroot pigweed
scentless chamomile (8.3)
shepherd's-purse (8.8)
stinkweed (8.8)
stork's-bill (7.7)
tartary buckwheat (8.3)
volunteer rapeseed (excluding smart-trait) (8.6)
wild mustard (8.8)

Ally 2 - 3 g/ac + MCPA

annual sunflower
ball mustard
bluebur*
chickweed (8.6)
common groundsel*
corn spurry*
cow cockle (8.7)
flixweed (7.6)
green smartweed (8.5)
hemp-nettle (8.5)
kochia (6.7)
lady's-thumb*
lamb's-quarters
plantain
prickly lettuce
prostrate pigweed*
redroot pigweed (8.0)
Russian pigweed
Russian thistle (8.0)
scentless chamomile*
shepherd's-purse (7.6)
stinkweed (8.6)
stork's-bill*
sweet clover
tartary buckwheat*
tumble mustard
volunteer rapeseed (including smart-trait) (8.6)
wild mustard (8.7)
wormseed mustard

Ally 2 - 3 g/ac + 2,4-D

annual sunflower
ball mustard
bluebur*
chickweed
common groundsel*
corn spurry*
cow cockle (8.6)
flixweed (9.0)
green smartweed (8.6)
hemp-nettle (8.4)
kochia (7.4)
lady's-thumb*
lamb's-quarters
narrow-leaved hawk's-beard (spring seedlings only)
plantain
prickly lettuce
prostrate pigweed*
redroot pigweed (8.3)
Russian pigweed
Russian thistle (7.7)
scentless chamomile*
shepherd's-purse (6.2)
stinkweed (8.2)
stork's-bill*
sweet clover
tartary buckwheat*
volunteer rapeseed (including smart-trait)
wild mustard (8.7)
wormseed mustard

* Weeds controlled only when mixtures contain Ally at 3 g/ac.

Ally (cont'd)

5. **Weeds Suppressed:** Ally (alone) 3 g/ac: buckwheat (wild (6.8)), lamb's-quarters (8.4), sow-thistle [annual, perennial], toadflax, thistles [Canada (7.7), Russian (7.8)]. Ally 2 g/ac + 2,4-D: buckwheat (wild) (6.7), Canada thistle (7.1).
6. **When Used:** Barley, wheat (durum, spring): 2 leaf to flag leaf stage. When mixing with 2,4-D or MCPA, apply from the full 3 leaf to just before flag leaf stage of wheat or barley. Ally + Avenge 200-C, Ally + Avenge 200-C + MCPA: 3 - 6 leaf stage of wheat and barley. Ally + Puma (wheat, including Durum): 2 - 6 leaf on main stem + 3 tillers. Ally + Puma Super (spring and durum wheat): 1 - 6 leaf on main stem + 3 tillers. Ally + Horizon (spring wheat only): 1 - 6 true leaves on main stem and prior to emergence of the 4th tiller. Ally + surfactant; Ally + Assure II + surfactant: 2 leaf to flag leaf stage of creeping red fescue. Best results are when applied to first main flush of young, actively growing weeds. Apply before the crop canopy is dense enough to prevent thorough coverage of the weeds. To control volunteer canola in advanced stages, add the recommended rate of MCPA or 2,4-D. Do not use in soils with pH greater than 7.9.
7. **How to Apply:**

   With: Ground equipment. Do **not** apply by air.

   Rate: When used alone: Ally 3 g/ac. When used with 2,4-D or MCPA: Ally 2 - 3 g/ac.

   Surfactant: 2 L/1000 L spray solution.

   Water volume: 40 L/ac (minimum).

   Pressure: 275 kPa.

   Nozzles: Flat fan types. 50 mesh or larger screens. Only metal or nylon filters.

   Sprayer clean-up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Ally when cleaning equipment.

   1. Drain and flush tank, boom and hoses with clean water for a minimum of 10 minutes. Visually inspect tank to assure removal of all visible residues of Ally. If necessary, repeat step 1.
   2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, and then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes **with agitation**. Again flush the hoses, boom and nozzles with the cleaning solution and drain tank.
   3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
   4. Repeat Step 2.
   5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.
8. **Application Tips:** Effectiveness may be reduced if spray mixture remains in tank for more than 48 hours.
9. **How it Works:** Absorbed by foliage and roots. Inhibits cell elongation.
10. **Expected Results:** Weed growth stops almost immediately. **Poor results may be expected if** improper mixing, timing, coverage or when weeds are under drought stress or moisture stress.
11. **Effects of Rainfall:** Heavy rainfall immediately before or after application may cause temporary lightening of crop. Rainfall within 2 hours of application may lessen degree of weed control.
12. **Movement in Soil:** Movement is restricted by fine textured soils, soil organic matter and neutral to acidic conditions.

13. **Grazing and Cropping Restrictions:** Wheat, barley or forage crops may be grazed by or fed to livestock any time after treatment. Do not use on soils with pH greater than 7.9.

		Minimum recropping intervals (months)*	
Crops for rotation	**Soil pH**	**Black/Grey Wooded Soils**	**Brown/Dark Brown Soils**
Oats	6.9 or lower	10	10
Oats	7.0 to 7.9	10	22
Barley, wheat, durum	7.9 or lower	10	10
Fescue	7.5 or lower	10	Field bioassay
Canary seed	6.9 or lower	48	48
Canary seed	7.0 to 7.9	48	48
Canola, flax	6.9 or lower	10	22
Canola	7.0 to 7.9	22	34
Flax	7.0 to 7.9	34	34
Lentils	6.9 or lower	34	34
Lentils	7.0 to 7.9	48	48
Yellow mustard	6.9 or lower	48	48
Yellow mustard	7.0 to 7.9	48	48
Alfalfa, red clover, peas	7.5 or lower	22	Field bioassay
All other crops	7.9 or lower	Field bioassay	Field bioassay

* If land has been treated with Ally and Assert the same year or in successive years, seed only wheat, excluding durum, until a field bioassay demonstrates that other crops can be seeded. When recropping to broadleaf crops following an Ally application, extend the rotational interval by 1 year if rainfall was less than 130 mm in the Brown and Dark Brown Soil Zones or 250 mm in the Black and Grey Wooded Soil Zones in any year within the stated interval prior to planting.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000.)

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place.

17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Odyssey, Pursuit, Unity, Refine Extra, the DF component of Laser DF and the Plus component of Triumph Plus and Champion Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Odyssey, Pursuit, Unity, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

13. Grazing and Cropping Restrictions: Wheat, barley or forage crops may be grazed by or fed to livestock any time after treatment. Do not use on soils with pH greater than 7.9.

		Minimum recropping intervals (months)*	
Crops for rotation	**Soil pH**	**Black/Grey Wooded Soils**	**Brown/Dark Brown Soils**
Oats	6.9 or lower	10	10
Oats	7.0 to 7.9	10	22
Barley, wheat, durum	7.9 or lower	10	10
Fescue	7.5 or lower	10	Field bioassay
Canary seed	6.9 or lower	48	48
Canary seed	7.0 to 7.9	48	48
Canola, flax	6.9 or lower	10	22
Canola	7.0 to 7.9	22	34
Flax	7.0 to 7.9	34	34
Lentils	6.9 or lower	34	34
Lentils	7.0 to 7.9	48	48
Yellow mustard	6.9 or lower	48	48
Yellow mustard	7.0 to 7.9	48	48
Alfalfa, red clover, peas	7.5 or lower	22	Field bioassay
All other crops	7.9 or lower	Field bioassay	Field bioassay

If land has been treated with Ally and Assert the same year or in successive years, seed only wheat, excluding durum, until a field bioassay demonstrates that other crops can be seeded. When recropping to broadleaf crops following an Ally application, extend the rotational interval by 1 year if rainfall was less than 130 mm in the Brown and Dark Brown Soil Zones or 250 mm in the Black and Grey Wooded Soil Zones in any year within the stated interval prior to planting.

14. Toxicity: Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000.)

15. Precautions, First Aid: Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. Storage: Store in a cool, dry place.

17. Resistance Management: Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Odyssey, Pursuit, Unity, Refine Extra, the DF component of Laser DF and the Plus component of Triumph Plus and Champion Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Odyssey, Pursuit, Unity, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Amber *(triasulfuron)*

Brown and Dark Brown soil zones only

Group 2

Manufacturer: **Novartis Crop Protection Canada Inc.**

1. **Formulations:** Water Dispersible Granule; 75%; Container 10 water soluble bag – 54 g/bag.

2. **Registered Mixes:** None.

   Surfactants: Agral 90, Ag-Surf, Citowett Plus, Super Spreader-Sticker, or Companion Agricultural adjuvant (Note: non-ionic surfactant). Add surfactant only if weeds have emerged and are not expected to be controlled by the seeding operation.

   Mixing instructions:

   1. To a clean spray tank, add one-quarter required amount of water.
   2. Engage gentle agitation. (Note: If using a sprayer with a by-pass agitation, allow the water soluble bags to completely dissolve before engaging the by-pass. Otherwise, undissolved bags could be sucked into the by-pass and plug the main screen.) Ensure that the agitation system is working properly and that it creates a rippling or rolling action of the water surface.
   3. Add the appropriate number of water soluble bags containing Amber into the spray tank. Do not touch water soluble bags with wet gloves.
   4. Allow six (6) minutes for complete mixing. (The bag may become brittle due to age and exposure to cold temperature. Also, longer mixing time may be required if the film is brittle or if the water is cold.)
   5. Continue agitation while completing the filling of sprayer, then, if required, add a recommended surfactant at 0.25% v/v (2.5 L for each 1000 L of water).
   6. Ensure Amber is completely in suspension before spraying.
   7. Continuous agitation is required to keep Amber in suspension. Do not allow the spray mixture to stand without agitation. Use the spray suspension as soon as it is prepared.

3. **Crops:** Wheat (HRSW,CPSW), Brown and Dark Brown Soil Zones only.

4. **Weeds Controlled:**

   11g/ac: common peppergrass, cow cockle, flixweed, redroot pigweed, stinkweed, tumble mustard, wild mustard.

   13 g/ac: above weeds plus kochia, Russian thistle, wild buckwheat.

5. **Weeds Suppressed:** Lamb's-quarters.

6. **When Used:** Apply pre-emergent to the bare ground or standing stubble on land scheduled to be planted to spring wheat the following spring.

   Fall application: During September or October and prior to freeze-up. Mechanical incorporation is not required.

   Spring application: As early as possible, during April or May prior to weed germination and seeding. Seeding with a discer or air seeder is usually sufficient for incorporation; seeding with press drills (hoe and disc) will require a **shallow** seedbed preparation (one pass, 3 - 5 cm deep) prior to seeding.

7. **How to Apply:**

   With: Ground equipment. Do not apply by air.

   Rate: 11 - 13 g/ac.

   Surfactant: 2.5 L/1000 L of water.

   Water volume: 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat Fan Types. 50 mesh or larger screen. Application of spray mixture perpendicular to the soil surface will result in optimal soil coverage and will minimize spray interception by standing stubble.

Incorporation: As most broadleaf weeds germinate and grow in the freshly cultivated soil layer, it is important to ensure that a lethal dose of Amber remains in the weed rooting zone. During deep incorporation, the Amber is diluted to a sub-lethal concentration which is not adequate for effective control. Where possible, cultivation should be no more than 5 cm or conducted prior to the application of Amber.

Sprayer clean-up: Immediately after spraying, thoroughly remove all traces of Amber from application equipment to avoid subsequent injury to crops other than cereals.

1. Drain and flush tank, boom and all hoses for several minutes with clean water containing a household detergent.
2. Fill the sprayer tank with clean water and add one litre of household ammonia (containing 3% ammonia) per 100 litres of water. Allow the solution to agitate for 15 minutes prior to flushing solution through the boom and nozzles and then drain the system.
3. Remove nozzles and screens and wash separately in a bucket containing the ammonia solution.
4. Thoroughly rinse the tank, hoses, booms, nozzles and screens with clean water for 5 minutes to remove all traces of ammonia.

8. **Application Tips:** Amber is not tied up by plant residues; however, excessive trash cover (i.e., straw and/or weeds) at the time of application can result in reduced weed control due to poor soil coverage. For such fields it is recommended to incorporate the excess trash prior to application of Amber. Do not apply Amber to snow covered soil or on frozen soil surfaces, since run-off could occur.

9. **How it Works:** Amber is rapidly translocated to the growing points of the roots and shoots where growth is inhibited.

10. **Expected Results:** Susceptible weeds stop growing soon after germination and turn yellow or purple before dying. Usually weeds will die before ever emerging from the soil.

11. **Effects of Rainfall:** Precipitation during the fall and winter period will provide sufficient moisture to adequately move the product into the weed germination zone. With spring applications, moisture is required for incorporation and activation of Amber prior to weed gemination. Best results are obtained when rainfall occurs following application and prior to weed germination. If rainfall has not occurred since spring application, mechanical incorporation will be required.

12. **Movement in Soil:** Amber is not expected to leach under Brown and Dark Brown soil types.

13. **Grazing and Cropping Restrictions:**

Grazing restrictions: Do not graze livestock on treated crops. Do not feed straw from treated crops to livestock.

Cropping restrictions:

Crop	Minimum interval (months)	
	pH 7.5 or less	Greater than pH 7.5
Spring wheat	No restrictions	No restrictions
Barley, oats, durum wheat	10	10
Flax, canary seed	22	Bioassay
Canola, peas	34	Bioassay
Lentils	46	Bioassay
All other crops	Bioassay	Bioassay

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000).

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Keep in original packaging during storage. Store above freezing in a dry, well-ventilated area away from other pesticides, fertilizers, food or feed. Prolonged storage at temperatures below 0°C may cause the soluble bag to become brittle.

Incorporation: As most broadleaf weeds germinate and grow in the freshly cultivated soil layer, it is important to ensure that a lethal dose of Amber remains in the weed rooting zone. During deep incorporation, the Amber is diluted to a sub-lethal concentration which is not adequate for effective control. Where possible, cultivation should be no more than 5 cm or conducted prior to the application of Amber.

Sprayer clean-up: Immediately after spraying, thoroughly remove all traces of Amber from application equipment to avoid subsequent injury to crops other than cereals.

1. Drain and flush tank, boom and all hoses for several minutes with clean water containing a household detergent.
2. Fill the sprayer tank with clean water and add one litre of household ammonia (containing 3% ammonia) per 100 litres of water. Allow the solution to agitate for 15 minutes prior to flushing solution through the boom and nozzles and then drain the system.
3. Remove nozzles and screens and wash separately in a bucket containing the ammonia solution.
4. Thoroughly rinse the tank, hoses, booms, nozzles and screens with clean water for 5 minutes to remove all traces of ammonia.

8. **Application Tips:** Amber is not tied up by plant residues; however, excessive trash cover (i.e., straw and/or weeds) at the time of application can result in reduced weed control due to poor soil coverage. For such fields it is recommended to incorporate the excess trash prior to application of Amber. Do not apply Amber to snow covered soil or on frozen soil surfaces, since run-off could occur.
9. **How it Works:** Amber is rapidly translocated to the growing points of the roots and shoots where growth is inhibited.
10. **Expected Results:** Susceptible weeds stop growing soon after germination and turn yellow or purple before dying. Usually weeds will die before ever emerging from the soil.
11. **Effects of Rainfall:** Precipitation during the fall and winter period will provide sufficient moisture to adequately move the product into the weed germination zone. With spring applications, moisture is required for incorporation and activation of Amber prior to weed gemination. Best results are obtained when rainfall occurs following application and prior to weed germination. If rainfall has not occurred since spring application, mechanical incorporation will be required.
12. **Movement in Soil:** Amber is not expected to leach under Brown and Dark Brown soil types.
13. **Grazing and Cropping Restrictions:**

Grazing restrictions: Do not graze livestock on treated crops. Do not feed straw from treated crops to livestock.

Cropping restrictions:

Crop	Minimal interval (months)	
	pH 7.5 or less	Greater than pH 7.5
Spring wheat	No restrictions	No restrictions
Barley, oats, durum wheat	10	10
Flax, canary seed	22	Bioassay
Canola, peas	34	Bioassay
Lentils	46	Bioassay
All other crops	Bioassay	Bioassay

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000).
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Keep in original packaging during storage. Store above freezing in a dry, well-ventilated area away from other pesticides, fertilizers, food or feed. Prolonged storage at temperatures below 0°C may cause the soluble bag to become brittle.

Amber (cont'd)

17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Refine Extra, the DF component of Laser DF, and the Plus component of Champion Plus and Triumph Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

    Specific resistance management strategies with Amber: Do not use Amber or other products utilizing the same mode of action repeatedly in the same field. To prevent or delay the selection of resistant weed populations, do not use Amber more than twice in a 36-month period in the same field. Integrate Amber into a long-term weed control program. Utilize broadleaf herbicides with a different mode of action and/or tillage in the break (fallow) year of a weed-control program (i.e., Rustler, 2,4-D, Banvel, tillage, etc.). Do not use Amber in any field where biotypes of broadleaf weeds have been identified to show resistance to Ally, Amber, Express, Muster, Refine Extra, the DF component of Laser DF and the Plus component of Champion Plus and Triumph Plus.

Amitrol 240 *(amitrole)*

Group 11

Manufacturer **Nufarm**

WARNING POISON

1. **Formulations:** Liquid; 240 g/L; 10 L containers.
2. **Registered Mixes:** Roundup.
3. **Crops:** Non-crop areas (fence rows, ditchbanks, roadsides), pastures, shelterbelts. Pre-plant: Beans (white), corn. Post-harvest: grain, peas. After final cutting: alfalfa, clover.
4. **Weeds Controlled:**
    - annual sow-thistle
    - annual weeds (most)
    - Canada thistle (7.4)
    - cattails
    - dandelion
    - field horsetail
    - hoary cress
    - leafy spurge
    - perennial sow-thistle
    - quackgrass
    - showy milkweed
    - toadflax
5. **Weeds Suppressed:** None.
6. **When Used:**

    Alfalfa, asparagus, clover: After final cutting, **not** after October 1.
    Corn, beans (white): Pre-planting.
    Crops: Non-selective, spot treatment. Pre-seeding.
    Grain, peas: Post-harvest, **not** after October 1.
    Shelterbelts: In established plantings only.
    Cattails: After catkins are fully formed up to frost.
    Cress (hoary), spurge (leafy): During advanced rosette and bud stages.
    Horsetail: During vigorous growth.
    Milkweed: Early summer when all shoots have emerged.
    Quackgrass: 10 - 15 cm tall.
    Thistles: Early bud to bloom.
    Toadflax: Advanced rosette to pre-bud.
7. **How to Apply:**

    With: Ground equipment; hand sprayer. Do not apply by air.

Rate:

Non-crop areas	**L/ac**
Cress, dandelion, milkweed, quackgrass, toadflax, thistles	1.68 - 11.2
Cattails, spurge	15 - 18.3
Crop areas	
Alfalfa, clover (after final cut)	5.0 - 6.6
Beans, corn (pre-plant) – quackgrass, Canada thistle, dandelion	1.68 - 6.6
Corn (pre-plant) – annual weeds, quackgrass, dandelion	1.68 - 6.6
Grain, peas (post-harvest)	5.0 - 6.6
Shelterbelts	7.5 - 11.2
Spot treatment of regrowth	**1/2 of original rate**

Water volume: Non-crop areas: 40 - 120 L/ac minimum.
Crop areas: 40 - 80 L/ac; Asparagus: 40 - 80 L/ac; Shelterbelts: 40 - 120 L/ac.

Pressure: 150 - 275 kPa.

8. **Application Tips:** Spray to point of runoff, complete coverage of weeds essential. Under or around desirable plants or trees; avoid contact with foliage, green stems or fruit as severe injury or destruction may result. Use a hooded sprayer if necessary. Do not disturb or mow treated plants for at least 2 weeks after treatment. If no tillage is possible, then spot treat weed regrowth with 1/2 original rate. Do not apply where water will be used for irrigating, drinking or other domestic use. Do not spray near sparks or open flame. Apply Amitrol-T in the early morning or evening when the humidity is higher, for best results. Avoid application when daytime temperatures exceed 25°C or when air conditions are very dry.
9. **How it Works:** Systemic herbicide which inhibits chlorophyll production. Moves through foliar and root system.
10. **Expected Results:** Whitening begins in 7 - 14 days and plants die. **Poor results may be expected if** poor coverage, inadequate rate, plants over mature or under drought stress or if tilled too soon after application.
11. **Effects of Rainfall:** Heavy rain within 6 - 8 hours reduces effectiveness.
12. **Movement in Soil:** At recommended rates – persists in soil 2 - 6 weeks.
13. **Grazing and Cropping Restrictions:** Do not graze treated crops or weeds; sufficient data is not available to support such use. Most crops susceptible to drift.

    Succeeding crops: After post-harvest treatment of grain, peas, alfalfa or clover, do not plant to crop for 8 months.
14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical amitrole (>4,000), technical ammonium thiocyanate – carrier (764). May be irritating to skin and eyes. Non-toxic to fish and birds. **Caution:** Possible human goitrogen. Do not apply on foraging bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Do not re-enter treated areas within 12 hours.
16. **Storage:** Do not freeze or store above 30°C. No shelf life limitation. If frozen, contents will crystallize – to resuspend, warm to 27°C and agitate as necessary.

Rate:

Non-crop areas	**L/ac**
Cress, dandelion, milkweed, quackgrass, toadflax, thistles	1.68 - 11.2
Cattails, spurge	15 - 18.3
Crop areas	
Alfalfa, clover (after final cut)	5.0 - 6.6
Beans, corn (pre-plant) – quackgrass, Canada thistle, dandelion	1.68 - 6.6
Corn (pre-plant) – annual weeds, quackgrass, dandelion	1.68 - 6.6
Grain, peas (post-harvest)	5.0 - 6.6
Shelterbelts	7.5 - 11.2
Spot treatment of regrowth	**1/2 of original rate**

Water volume: Non-crop areas: 40 - 120 L/ac minimum.
Crop areas: 40 - 80 L/ac; Asparagus: 40 - 80 L/ac; Shelterbelts: 40 - 120 L/ac.

Pressure: 150 - 275 kPa.

8. **Application Tips:** Spray to point of runoff, complete coverage of weeds essential. Under or around desirable plants or trees; avoid contact with foliage, green stems or fruit as severe injury or destruction may result. Use a hooded sprayer if necessary. Do not disturb or mow treated plants for at least 2 weeks after treatment. If no tillage is possible, then spot treat weed regrowth with 1/2 original rate. Do not apply where water will be used for irrigating, drinking or other domestic use. Do not spray near sparks or open flame. Apply Amitrol-T in the early morning or evening when the humidity is higher, for best results. Avoid application when daytime temperatures exceed 25°C or when air conditions are very dry.
9. **How it Works:** Systemic herbicide which inhibits chlorophyll production. Moves through foliar and root system.
10. **Expected Results:** Whitening begins in 7 - 14 days and plants die. **Poor results may be expected if** poor coverage, inadequate rate, plants over mature or under drought stress or if tilled too soon after application.
11. **Effects of Rainfall:** Heavy rain within 6 - 8 hours reduces effectiveness.
12. **Movement in Soil:** At recommended rates – persists in soil 2 - 6 weeks.
13. **Grazing and Cropping Restrictions:** Do not graze treated crops or weeds; sufficient data is not available to support such use. Most crops susceptible to drift.

    Succeeding crops: After post-harvest treatment of grain, peas, alfalfa or clover, do not plant to crop for 8 months.
14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical amitrole (>4,000), technical ammonium thiocyanate – carrier (764). May be irritating to skin and eyes. Non-toxic to fish and birds. **Caution:** Possible human goitrogen. Do not apply on foraging bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Do not re-enter treated areas within 12 hours.
16. **Storage:** Do not freeze or store above 30°C. No shelf life limitation. If frozen, contents will crystallize – to resuspend, warm to 27°C and agitate as necessary.

Anthem *(sulfosulfuron + 2,4-D LV Ester 700)*

Group 2,4

Manufacturer **Monsanto Canada Inc.**

WARNING POISON

1. **Formulations:** Water dispersible granule; 75%; 2 x 216 g pouches Sundance + 1 x 10.3 L 2,4-D LV Ester 700 + 1 x 8 L Merge.

2. **Registered Mixes:** None. The following mixing instructions will be revised for the 2000 crop season. Please check the label or contact a Monsanto representative.

   Mixing instructions: Fill the spray tank 3/4 full and start agitation. Slowly add Anthem granules (11g/ac). Add 2,4-D LV Ester 700 (243 mL/ac). Add Merge (202 mL/ac) and complete the filling process while maintaining agitation. Maintain an air gap during filling and remove the hose from the mixing tank immediately after filling to avoid siphoning back into the carrier source. Spray solutions should be applied immediately, and if spraying is interrupted, sufficient agitation must be conducted to completely re-suspend any precipitated product.

3. **Crops:** Wheat, spring; durum (Kyle and Plenty).

4. **Weeds Controlled:**

   cleavers
   common chickweed
   dandelion
   foxtail barley
   green smartweed
   kochia
   lady's-thumb
   lamb's-quarters
   narrow-leaved hawk's-beard
   perennial sow-thistle
   redroot pigweed
   stinkweed
   stork's-bill
   volunteer canola (including SMART)
   wild buckwheat
   wild mustard
   wild oats

5. **Weeds Suppressed:** Green foxtail, quackgrass.

6. **When Used:**

   Crop Stage: Wheat: Before the fourth tiller.

   Weed Stage: Wild oats: Up to the 6 leaf stage and no later than the 3 tiller stage. For optimum performance and yield response, apply prior to tillering of wild oats. For annual broadleaves, seedling weeds are controlled much easier than larger weeds. Perennial weeds should be treated prior to the flower stage and during a period of active growth.

7. **How to Apply:**

   With: Ground equipment only.

   Rate: Anthem: 11 g/ac + 2,4-D LV: 243 mL/ac + Merge: 202 mL/ac.

   Water volume: 23 - 45 L/ac. Always use clean water, free of sediments.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

   Incorporation: Not applicable.

8. **Application Tips:** For optimum control, apply Anthem to actively growing weeds. Early application (prior to the first tiller of wild oats) will maximize crop yields by reducing weed competition. Do not apply Anthem to wheat stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

9. **How it Works:** Anthem is a systemic herbicide that is translocated to the growing points in plants. Anthem inhibits cell division rapidly. 2,4-D is a hormone-type herbicide that causes abnormal growth.

10. **Expected Results:** Growth is inhibited rapidly. Symptoms will be observed in 4 - 5 days; however, complete kill will not be observed until 14 - 25 days after treatment.

11. **Effects of Rainfall:** Rainfall within 2 hours after application may reduce performance.

12. **Movement in Soil:** Movement of this herbicide in soil is minimal.

13. **Grazing and Cropping Restrictions:** Anthem-treated fields may be rotated to the following crops the year after treatment: all wheat varieties including durum and imazethapyr tolerant canola (i.e. Pursuit Smart canola). In the second year after treatment (22 months after application), the following crops may be planted: wheat, durum wheat, barley, canola, peas or flax. In fields with areas of high soil pH and low organic matter, injury to crops other than wheat or Smart canola may be observed within the recommended plant-back timing interval. For fields having these conditions, or for any crop not listed above, do not plant for at least 22 months after application. A field bioassay must be conducted the year prior to growing the crop of interest to confirm crop safety.

14. **Toxicity:**

    Anthem: Acute oral LD_{50} (rats) (mg/kg) = (>5000).

    2,4-D: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (300 - 1200). May cause skin irritation.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store under cool, dry conditions (below 50°C). Do not store under moist conditions. Heated storage is required for 2,4-D and Merge.

17. **Resistance Management:** Anthem contains sulfosulfuron, which is a group 2 herbicide. Any weed population may contain plants naturally resistant to sulfosulfuron. Avoid repeated use of Anthem herbicide or other herbicides that are in group 2.

Arsenal *(imazapyr)*

Group 2

Manufacturer: **Cyanamid Crop Protection**

1. **Formulations:** Aqueous solution; 240 g/L; 9.5 L container.

2. **Registered Mixes:** None.

   Surfactants: Only required if spray volume is greater than 223 L/ac. Use non-ionic surfactant at 1 L/400 L of spray solution.

   Foam reducing agent: May be added at the recommended rate, if required.

3. **Crops:** Non-crop/non-graze areas such as industrial sites or rail road ballast. Spot treatments for rail and hydro rights of way, pipeline rights of way and pipeline stations including well sites, battery stations and compressor or valve stations.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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Arsenal (cont'd)

4. **Weeds Controlled:**
   Annual and perennial grassy and broadleaved weeds

[illegible]

- annual sow-thistle
- black medic
- cinquefoil (rough)
- common groundsel
- hemp-nettle
- kochia
- lamb's-quarters
- mustard spp.
- pigweed spp.
- pineappleweed
- ragweed spp.
- Russian thistle
- stinkweed
- wild buckwheat
- annual bluegrass
- foxtail spp.
- old witchgrass

[illegible]

- bladder campion
- bull thistle
- burdock
- Canada thistle
- clover spp.
- dandelion
- dog-strangling vine
- field bindweed
- goat's-beard
- goldenrod
- leafy spurge
- milkweed
- mouse-eared chickweed
- mullein spp.
- ox-eye daisy
- plantain spp.
- poison ivy
- sheep sorrel
- sulphur cinquefoil
- toadflax
- tufted vetch
- wild carrot
- wild grape
- wild strawberry

[illegible]

- bromegrass
- Canada bluegrass
- fescue spp.
- quackgrass
- yellow nutsedge
- maple
- poplar
- raspberry
- wild rose

5. **Weeds Suppressed:** None.
6. **When Used:** Apply post-emergence to actively growing weeds and seedling woody species. Control of non-emerged sensitive species will also be provided in the year of application.
7. **How to Apply: This product is to be applied by licensed applicators only.**

   With: Ground equipment: High volume, high pressure handguns and vehicle-mounted directed spray equipment or conventional boom-mounted, manifold-mounted or off-centre nozzles. Low volume hand-held backpacks, knapsack or other pump-up type sprayers may also be used for direct applications to foliage.

   Rate: 1.21 L/ac.

   Water volume: 40 - 223 L/ac.

   Pressure: 175 - 425 kPa.

   Nozzles: Select proper nozzles to avoid spraying a fine mist.

   Suggested tips include: Spraying Systems 1503E, 1504E, 1506E, 2003E, 2004E, 4003E or 4004E Flat Fan Tip; Spraying Systems 5500X-3 or X-4 Adjustable Cone Tip; Spraying Systems 5780 Cone Tip. (attached to a Model 43L Gunjet or comparable applicator)

   Sprayer clean-up: Thoroughly clean all traces of Arsenal from application equipment immediately after use. Flush tank, pump, hoses and boom with several changes of water after removing nozzle tips and screens. Clean nozzles and screen separately. Drain and flush equipment away from desirable trees and plants. Do not contaminate water when disposing of equipment wash waters.

   Incorporation: Not applicable.

Arsenal (cont'd)

4. **Weeds Controlled:**
   Annual and perennial grassy and broadleaved weeds

Annual broadleaf weeds

- annual sow-thistle
- black medic
- cinquefoil (rough)
- common groundsel
- hemp-nettle
- kochia
- lamb's-quarters
- mustard spp.
- pigweed spp.
- pineappleweed
- ragweed spp.
- Russian thistle
- stinkweed
- wild buckwheat

Annual grass weeds

- annual bluegrass
- foxtail spp.
- old witchgrass

Perennial/Biennial weeds

- bladder campion
- bull thistle
- burdock
- Canada thistle
- clover spp.
- dandelion
- dog-strangling vine
- field bindweed
- goat's-beard
- goldenrod
- leafy spurge
- milkweed
- mouse-eared chickweed
- mullein spp.
- ox-eye daisy
- plantain spp.
- poison ivy
- sheep sorrel
- sulphur cinquefoil
- toadflax
- tufted vetch
- wild carrot
- wild grape
- wild strawberry

Perennial grass/Sedge weeds

- bromegrass
- Canada bluegrass
- fescue spp.
- quackgrass
- yellow nutsedge

Woody species (seedling)

- maple
- poplar
- raspberry
- wild rose

5. **Weeds Suppressed:** None.

6. **When Used:** Apply post-emergence to actively growing weeds and seedling woody species. Control of non-emerged sensitive species will also be provided in the year of application.

7. **How to Apply: This product is to be applied by licensed applicators only.**

   With: Ground equipment: High volume, high pressure handguns and vehicle-mounted directed spray equipment or conventional boom-mounted, manifold-mounted or off-centre nozzles. Low volume hand-held backpacks, knapsack or other pump-up type sprayers may also be used for direct applications to foliage.

   Rate: 1.21 L/ac.

   Water volume: 40 - 223 L/ac.

   Pressure: 175 - 425 kPa.

   Nozzles: Select proper nozzles to avoid spraying a fine mist.

   Suggested tips include: Spraying Systems 1503E, 1504E, 1506E, 2003E, 2004E, 4003E or 4004E Flat Fan Tip; Spraying Systems 5500X-3 or X-4 Adjustable Cone Tip; Spraying Systems 5780 Cone Tip. (attached to a Model 43L Gunjet or comparable applicator)

   Sprayer clean-up: Thoroughly clean all traces of Arsenal from application equipment immediately after use. Flush tank, pump, hoses and boom with several changes of water after removing nozzle tips and screens. Clean nozzles and screen separately. Drain and flush equipment away from desirable trees and plants. Do not contaminate water when disposing of equipment wash waters.

   Incorporation: Not applicable.

8. **Application Tips:** Apply in sufficient water (40 - 223 L/ac) to wet all foliage during periods of active growth. Do not mix or store in unlined steel (except stainless steel) containers or spray tanks. Do not use where roots from desirable vegetation may extend into the treated area. Maintain a distance from desirable trees equal to at least twice the distance from the trunk to the dripline. Do not apply where run off water may flow onto agricultural land.
9. **How it Works:** Absorbed by both roots and foliage of sensitive vegetation. Translocated in both the xylem and the phloem. Non-selective.
10. **Expected Results:** Plants stop growing within 24 - 48 hours. Yellow, purplish and/or red discoloration of the leaves may occur. The growing point of the plant and youngest leaves begin to die first with symptoms eventually progressing to older leaves. Chlorosis and tissue necrosis may not be apparent in some plant species until 2 weeks after application. Complete kill of plants may not occur for several weeks. Season-long control of sensitive species.
11. **Effects of Rainfall:** Rainfall within 2 hours may decrease foliar activity. Rainfall does not affect root activity or the control of non-emerged sensitive species.
12. **Movement in Soil:** Is not leached appreciably.
13. **Grazing or Cropping Restrictions:** Non-crop/non-graze applications only. Do not graze the treated area or cut for hay.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) 5,000. Non-toxic to fish, birds and bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store above -12°C. Arsenal should not be mixed or stored in unlined steel (except stainless steel) containers or spray tanks.

Assert 300 *(imazamethabenz)*

Group 2

Manufacturer **Cyanamid Crop Protection**

CAUTION POISON

1. **Formulations:** Suspension concentrate 300g/L; 10.8 L pail.
2. **Registered Mixes:** MCPA Ester (spring and durum wheat, barley), 2,4-D Ester (spring and durum wheat, barley), Estaprop (spring wheat, durum wheat and barley), Express Pack (spring wheat, durum wheat, barley), Refine Extra (spring and durum wheat, barley), Refine Extra + MCPA Ester (spring and durum wheat, barley), Curtail M (spring wheat, durum wheat, barley), Puma (spring and durum wheat), Turboprop 600 (spring and durum wheat). Unity 75WG and Unity 280EC (spring and durum wheat, barley), Puma Super (spring and durum wheat), Prestige (spring wheat and barley). Do not tank mix Assert when used on sunflowers.

   Mixing instructions: Fill tank 3/4 full with water, start agitation. If mixing with Express Pack, Refine Extra or Unity 75WG, add the Express Pack, Refine Extra or Unity 75WG to the tank and agitate, mixing thoroughly to ensure the product is completely dissolved. Add one package of Spray Water pH Adjuster per jug of Assert to tank and agitate until dissolved. Add Assert to the partially filled tank while agitating. If using Puma, Puma Super, MCPA Ester, 2,4-D Ester, Estaprop, Curtail M, Prestige, Turboprop 600, or Unity 280EC in the tank mix, add to the tank. Fill remainder of tank with water and agitate, or, cycle at least five minutes before spraying to ensure thorough mixing. Continue agitation until spraying is complete.

Assert 300 (cont'd)

Note: When using Express Pack, Refine Extra or Unity on repeated tank loads, if any tank mix solution remains in the tank, prepare a slurry and add it to the 3/4 filled tank.

Mixing restrictions: Do not tank mix with phenoxy amines.

Mixing rates: MCPA Ester (500 g/L) up to 0.45 L/ac.; 2,4-D Ester (570 g/L) up to 0.4 L/ac. Refine Extra (8 g/ac) and Refine Extra (8 g/ac) + MCPA Ester (500 g/L) up to 0.45 L/ac, Estaprop (710 mL/ac), Express Pack (4 g/ac Express Plus 0.25 L/ac 2,4-D Ester), Curtail M (0.8 L/ac), Puma (0.15 L/ac), Turboprop 600 (710 mL/ac). Unity 75WG (4.3 g/ac), Unity 280EC (200 mL/ac), Puma Super (0.15 L/ac).
Prestige (A - 320 mL/ac, B - 809 mL/ac).

3. **Crops:** Barley: all varieties (8.5). Wheat [spring (8.8), durum (8.3)]: all varieties. Sunflowers: all varieties including semi-dwarf and sunola.
4. **Weeds Controlled:** Mustard, wild (7.8); wild oats (7.8); and stinkweed (8.2); sunflower rate will control wild mustard and stinkweed only.
5. **Weeds Suppressed:** Wild buckwheat (5.4) and tartary buckwheat (3.5).
6. **When Used:** 1 - 6 true leaf stage (total leaves including all tillers), with a maximum of 2 tillers. 1 - 3 true leaf stage of the wild oats to minimize wild oat competition. Very good control at 4 true leaf stage. Application can be made up to and including the 6 leaf stage of the crop (before the flag leaf). When mixed with 2,4-D, MCPA Ester, Estaprop or Turboprop, do not apply before 4 leaf stage of crop. Do not apply Assert within five days of any herbicide which is not a registered tank mix with the exception of Lontrel, Laser or Ally.

   Sunflower: 2 - 8 leaf stage (less than 38 cm high for regular varieties, less than 30 cm high for semi-dwarf varieties and less than 10 cm high for dwarf varieties). Crop injury may occur beyond the 8 leaf stage.

   Wild mustard and stinkweed: Cotyledon to 6 leaf stage.
7. **How to Apply:**

   With: Ground equipment only.

   Rate:

Soil zone	Wild oat stage	Assert alone (L/ac)	Assert tank mixes (L/ac)	
			with Puma/ Puma Super	All others
Black and Grey Wooded soil zones	1 - 3 leaves	0.54	0.54	0.67
	4 - 6 leaf stage (all leaves, including tillers), up to 2 tillers	0.67	0.54	0.67
Brown and Dark Brown soil zones	1 - 3 leaves	0.54	0.54	0.54
	4 - 6 leaf stage (all leaves, including tillers), up to 2 tillers	0.67	0.54	0.67

   Sunflower rate: 0.34 L/ac.

   Water volume: Assert tank mixed with Refine Extra, Refine Extra + MCPA Ester, Express Pack, Curtail M, Puma, Puma Super, Prestige or Unity: 40 L/ac. Assert alone, Assert tank mixed with 2,4-D Ester, MCPA Ester or Estaprop: 20 L/ac.

   Water: Use Assert with the pH reducing agent Spraywater pH Adjuster or poor weed control may occur. For ground-driven pump systems, ensure Spraywater pH Adjuster is dissolved before engaging pump.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended; tilted 45° forward for better penetration. 50-mesh screens and filters.

   Incorporation: Not applicable.
8. **Application Tips:** Do not spray if freezing temperatures are forecast.
9. **How it Works:** Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions.

Assert 300 (cont'd)

Note: When using Express Pack, Refine Extra or Unity on repeated tank loads, if any tank mix solution remains in the tank, prepare a slurry and add it to the 3/4 filled tank.

Mixing restrictions: Do not tank mix with phenoxy amines.

Mixing rates: MCPA Ester (500 g/L) up to 0.45 L/ac.; 2,4-D Ester (570 g/L) up to 0.4 L/ac. Refine Extra (8 g/ac) and Refine Extra (8 g/ac) + MCPA Ester (500 g/L) up to 0.45 L/ac, Estaprop (710 mL/ac), Express Pack (4 g/ac Express Plus 0.25 L/ac 2,4-D Ester), Curtail M (0.8 L/ac), Puma (0.15 L/ac), Turboprop 600 (710 mL/ac). Unity 75WG (4.3 g/ac), Unity 280EC (200 mL/ac), Puma Super (0.15 L/ac), Prestige (A - 320 mL/ac, B - 809 mL/ac).

3. **Crops:** Barley: all varieties (8.5). Wheat [spring (8.8), durum (8.3)]: all varieties. Sunflowers: all varieties including semi-dwarf and sunola.

4. **Weeds Controlled:** Mustard, wild (7.8); wild oats (7.8); and stinkweed (8.2); sunflower rate will control wild mustard and stinkweed only.

5. **Weeds Suppressed:** Wild buckwheat (5.4) and tartary buckwheat (3.5).

6. **When Used:** 1 - 6 true leaf stage (total leaves including all tillers), with a maximum of 2 tillers, 1 - 3 true leaf stage of the wild oats to minimize wild oat competition. Very good control at 4 true leaf stage. Application can be made up to and including the 6 leaf stage of the crop (before the flag leaf). When mixed with 2,4-D, MCPA Ester, Estaprop or Turboprop, do not apply before 4 leaf stage of crop. Do not apply Assert within five days of any herbicide which is not a registered tank mix with the exception of Lontrel, Laser or Ally.

   Sunflower: 2 - 8 leaf stage (less than 38 cm high for regular varieties, less than 30 cm high for semi-dwarf varieties and less than 10 cm high for dwarf varieties). Crop injury may occur beyond the 8 leaf stage.

   Wild mustard and stinkweed: Cotyledon to 6 leaf stage.

7. **How to Apply:**

   With: Ground equipment only.

   Rate:

[illegible]	[illegible]	[illegible]	Assert tank mixes (L/ac)	
			with Puma/ Puma Super	All others
Black and Grey Wooded soil zones	1 - 3 leaves	0.54	0.54	0.67
	4 - 6 leaf stage (all leaves, including tillers), up to 2 tillers	0.67	0.54	0.67
Brown and Dark Brown soil zones	1 - 3 leaves	0.54	0.54	0.54
	4 - 6 leaf stage (all leaves, including tillers), up to 2 tillers	0.67	0.54	0.67

   Sunflower rate: 0.34 L/ac.

   Water volume: Assert tank mixed with Refine Extra, Refine Extra + MCPA Ester, Express Pack, Curtail M, Puma, Puma Super, Prestige or Unity: 40 L/ac. Assert alone, Assert tank mixed with 2,4-D Ester, MCPA Ester or Estaprop: 20 L/ac.

   Water: Use Assert with the pH reducing agent Spraywater pH Adjuster or poor weed control may occur. For ground-driven pump systems, ensure Spraywater pH Adjuster is dissolved before engaging pump.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended; tilted 45° forward for better penetration. 50-mesh screens and filters.

   Incorporation: Not applicable.

8. **Application Tips:** Do not spray if freezing temperatures are forecast.

9. **How it Works:** Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions.

10. **Expected Results:**

    Wild oats: Stop growing within 24 - 48 hours. Yellow striping and purplish discoloration of the leaf may occur. Leaves begin to die in 3 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks. Symptoms may occur more slowly at lower temperatures and high rainfall. Better control at the high rate in the Black and Grey Wooded soil zones.

    Stinkweed and wild mustard: Begin to yellow and die in 3 - 10 days; usually die before the wild oats. At the sunflower rate, injury signs on the wild mustard may take up to 2 weeks. Death may not occur for several weeks.

    Wild and tartary buckwheat: Will slow or stop growth. Competition from these weeds will be reduced.

11. **Effects of Rainfall:** Rainfall within 6 hours may decrease activity.

12. **Movement in Soil:** Is not leached appreciably.

13. **Grazing and Cropping Restrictions:** Fields treated with Assert may be grazed, cut for hay and fed to livestock after harvest of the grain. **Do not apply Assert to the same field two years in a row.**

    Succeeding crops:

    Black and Grey Wooded soil zones: Rotate to spring wheat, durum wheat, barley, sunflower, SMART canola, canola, flax and peas, the year following Assert.

    Brown and Dark Brown soil zones: Rotate only to wheat, durum wheat, barley, SMART canola and sunflowers the year following Assert. Two years after application of Assert, the following crops can be grown in all soil zones: wheat (spring and durum), barley, sunflower, peas, SMART canola, canola, flax, oats and canary grass. Conduct a field bioassay before planting lentils or sugar beets.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (3,078). Non-toxic to fish, birds or bees.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Do not freeze.

Assure II *(quizalofop p-ethyl)*

Group 1

Manufacturer **DuPont Canada Inc.**

1. **Formulations:** Emulsifiable concentrate; 96 g/L; 1 x 8 L + 8 L Sure-Mix.

2. **Registered Mixes:** Muster (8 - 12 g/ac), Ally (3 g/ac) (creeping red fescue).

   Mixing instructions:

   1. Make sure that spray tank is thoroughly cleaned before mixing.
   2. Fill tank half full with water. **Keep agitator running**.
   3. If tank mixing Assure II with Muster, use the following sequence:
      - Muster (ensure Muster is thoroughly dissolved before moving to next step)
      - Assure II
      - Slowly add Sure-Mix
      - Ensure that the herbicide is completely mixed before proceeding to the next step.
   4. Add the rest of the required water to the tank. Mix well before applying to the crop.

   On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of volume about to be mixed.

Assure II (cont'd)

3. **Crops:** Canola, flax (including linolenic acid varieties), soybeans, seed alfalfa, lentils, peas (field and processing), seedling legumes for seed production, creeping red fescue for seed production, sugarbeets.
4. **Weeds Controlled:**

   150 mL/ac: Green foxtail, volunteer barley, volunteer corn, volunteer oats, volunteer wheat, wild oats (1 - 5 leaf without tillers).

   200 mL/ac: Above weeds plus barnyard grass and tillered wild oats (up to two tillers).

   300 mL/ac: Above weeds plus quackgrass.
5. **Weeds Suppressed:** Quackgrass at the 200 mL/ac rate.
6. **When Used:**

   Crop: Up to beginning of bolting of canola.

   Annual grassy weeds: For wild oats, apply at the 1 - 5 leaf stage to early tillering (up to two tillers). Best results on wild oats are obtained if application is made prior to tillering. Use higher rate of Assure II when wild oats have tillers or when wild oats are present in populations exceeding 100 plants/m^2.

   Quackgrass: 2 - 6 leaf stage.
7. **How to Apply:**

   With: Ground equipment only. Do not apply by air.

   Rate: 150 - 300 mL/ac of Assure II plus Sure-Mix at 5 L/1000 L of spray solution. In sugarbeets, if a second flush of annual grasses or volunteer cereals is observed, apply an additional application of Assure II at 150 mL/ac plus surfactant. Do not exceed an accumulative, seasonal use rate of 300 mL/ac of Assure per year.

   Water volume: 40 L/ac. Under heavy weed pressures, you can use up to 160 L/ac.

   Pressure: 210 - 275 kPa.

   Nozzles: Flat fan with 50 mesh or coarser nozzle screens.

   Sprayer clean-out: Thoroughly clean all traces of Assure II from application equipment immediately after use. Flush tank, pump, hoses and boom with several changes of water after removing nozzle tips and screens (clean these parts separately). Failure to thoroughly clean the equipment may result in injury to subsequently sprayed grass crops.
8. **Application Tips:** When using a broadleaf herbicide other than those registered for tank mixing with Assure II, wait a minimum of 24 hours after the Assure II application to apply the broadleaf herbicide, or wait 7 days after the broadleaf application to apply Assure II.
9. **How it Works:** Assure II is a systemic herbicide that is rapidly absorbed and readily translocated from the treated foliage to the root systems and growing points of treated plants.
10. **Expected Results:** Grassy weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the younger plant tissues is followed by a progressive collapse of the remaining foliage. These results will generally be observed in 1 - 3 weeks, depending on the grass species treated and the environmental conditions. **Poor results may be expected if** there is improper mixing, timing or coverage, or when weeds are under stress.
11. **Effects of Rainfall:** Rainfall within 1 hour of application may reduce control.
12. **Movement in Soil:** No soil movement.
13. **Grazing and Cropping Restrictions:** Do not graze treated fields or harvest for forage or hay. Do not apply to canola within 64 days of harvest. Do not apply to flax within 82 days of harvest. Do not apply to lentils or peas (field and processing) within 65 days of harvest.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) > 5,000 mg/kg. May irritate eyes, nose, throat and skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place not below 5°C.
17. **Resistance Management:** Certain naturally occurring biotypes of wild oats and green foxtail have been identified in western Canada that are resistant to Assure II and related products (those with the same mode of action). Selection of resistant biotypes, through repeated use of these herbicides, may result in control failures. To delay selection for resistant populations of weeds, rotate the use of Assure II with herbicides that have a different mode of action, or use cultural practices that are effective in controlling these weeds. If poor performance cannot be attributed to adverse weather conditions or improper application methods, a resistant biotype may be present. If resistance is suspected, contact your local representative of DuPont Canada Inc. for assistance. If resistance is identified, additional treatments with Assure II or related herbicides will be ineffective and are not recommended.

Atrazine

Group 5

Manufacturer: **Novartis Crop Protection Canada Inc./United Agri Products**

1. **Formulations:**

   Liquid: Aatrex Liquid (Novartis Crop Protection Canada Inc.); 480 g/L; 2 x 10 L jug.

   Water Dispersible Granule (WDG): Aatrex Nine-0 (Novartis Crop Protection Canada Inc.); 90%; 1 x 10 kg pack.

   Flowable: Atrazine 480 (United Agri Products); 480 g/L; 2 x 10 L pack.

2. **Registered Mixes:** Crop oil concentrate, dry bulk granular fertilizers, nitrogen solutions or complete liquid fertilizers, Banvel, Dual, Bladex, Sutan$^+$.

   Mixing restrictions: Do not mix oil concentrates, surfactants or hormone type herbicides with any mixture of Atrazine plus Bladex. Tank Mixes: add water, then Atrazine, agitate, add Bladex slowly, agitate thoroughly.

3. **Crops:** Corn [(field (9.0), sweet (8.6)].

4. **Weeds Controlled:**

   annual smartweed
   common purslane
   lady's-thumb
   lamb's-quarters
   ragweed
   redroot pigweed
   volunteer clover
   wild buckwheat
   wild mustard
   wild oats
   wormseed mustard

5. **Weeds Suppressed:** None.

6. **When Used:**

   Aatrex Nine-O, Aatrex Liquid, Atrazine 480, Atrazine 90W: Pre-plant, pre-emergent, post-emergent or band applied.

7. **How to Apply:**

   With: Ground equipment.

   Rate:
   Aatrex Liquid, Atrazine 480: 0.85 - 1.25 L/ac.
   Aatrex Nine-O: 0.44 - 0.68 kg/ac.

   Note: Vary rates according to different soil types. (Lower rates in light and sandy soils. Higher rates in heavy clay soils).

   Water volume: 60 - 120 L/ac.

   Pressure: 200 - 300 kPa.

   Nozzles: Flat fan recommended.

Atrazine (cont'd)

Incorporation: Only Aatrex Liquid, Atrazine 480, Aatrex Nine-O are applied pre-plant; Do not incorporate deeper than 5.0 cm. Pre-emergent treatments require rainfall within 10 days or a light cultivation.

8. **Application Tips:** Continuous gentle agitation is needed. Avoid excessive agitation, especially with oil mixtures, as a grease-like mass may form. Use oil mixes at once and clean tank and system with a strong detergent solution. Use 50 mesh or larger strainers and use only metal filters. Bypass line should discharge to bottom of tank. Band treatments are desirable when cultivation is to alleviate hard soil conditions or to control annual weeds.
9. **How it Works:** Inhibits photosynthesis.
10. **Expected Results:** Weeds slow to emerge or under drought conditions will be killed when moisture improves. Heavy rainfall on sandy soils may cause leaching, a decrease in efficacy and off target injury.
11. **Effects of Rainfall:** Rainfall will activate the chemical, carrying it into the root zone where kill will begin.
12. **Movement in Soil:** Heavy rainfall on sandy soils may cause leaching and soil movement.
13. **Grazing and Cropping Restrictions:** Plant only to corn in year of treatment. The use of atrazine on the prairies is not recommended when corn is grown in rotation with other crops except triazine-tolerant canola. Breakdown of atrazine in the soil is slow and may cause injury to sensitive crops (e.g., cereals, canola, sugar beets) one or more years after application. Crops most tolerant after corn and triazine tolerant canola are sorghum, then flax, faba beans and peas. The risk of damage to succeeding crops from atrazine residues may be reduced by ploughing or deep tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the atrazine levels. Uneven application, excessive sprayer overlap or applications in excess of recommended rates will not injure corn but may result in a longer carryover of atrazine residues. A prolonged period of dry weather will also lengthen the time that atrazine residues remain in the soil.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = Aatrex 1,075 (female), Aatrex Nine-O = 1,600. May cause eye irritation. Very low toxicity to fish and birds. This product should not be mixed/loaded within 30 metres of any wells, lake, stream or pond to avoid potential well or surface water contamination.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** The flowable formulations should be kept from freezing. If stored in unheated areas, the product should be warmed and agitated thoroughly prior to using.

Attain *(fluroxypyr + 2,4-D LV ester)*

Group 4

Manufacturer: **Dow AgroSciences Canada Inc.**

1. **Formulations:**

   Attain A: Fluroxypyr 180 g/L EC 9.6 L jug.

   Attain B: 2,4-D LV ester 564 g/L EC 2 x 8.0 L jugs.
2. **Registered Mixes:** Achieve 80DG, Horizon 240 g/L (95 or 115 mL/ac + Score; **spring wheat only**), Puma Super (**spring wheat only**), Assert (Barley and spring wheat excluding durum - 0.53 L/ac for 1 - 3 leaf wild oat; 0.65 L/ac for 4 leaf wild oat).
3. **Crops:** Spring wheat (except durum), barley.

4. Weeds Controlled:

annual sunflower
bluebur
burdock
canola (volunteer) (9.0)
cleavers (1 - 4 whorls) (8.8)
cocklebur
flixweed (9.0)
field horsetail*
goat's-beard
hoary cress*
kochia*** (8.0)
lamb's-quarters (8.8)
mustards (except green, dog, tansy)
plantain
prickly lettuce
ragweed
round-leaved mallow (1 - 6 leaf)(8.6)
shepherd's-purse (9.0)
stinkweed (8.9)
stork's-bill (1 - 8 leaf)(8.4)
sweet clover
vetch
volunteer flax (1 - 12 cm)(8.4)
wild radish
wild buckwheat (1 - 4 leaf) (8.4)
wild mustard (8.9)

The following weeds will be controlled only when growing rapidly (control may reduce when weed infestations are heavy or if flowering has initiated):

blue lettuce*
dandelion**
docks
dog mustard
field bindweed*
field peppergrass
gumweed
hairy galinsoga
hedge bindweed
lady's-thumb
leafy spurge*
oak-leaved goosefoot
redroot pigweed (8.8)
Russian thistle (7.6)
smartweed (8.3)
tansy
tartary buckwheat

5. Weeds Suppressed:

annual sow-thistle
common chickweed*** (up to 8 cm) (7.2)
Canada thistle (6.8)
hemp-nettle (2 - 6 leaf stage) (7.7)
perennial sow-thistle* (8.1)

* Top growth control only.
** Spring rosettes.
*** Including biotypes resistant to Group 2 herbicides that inhibit the ALS/AHAS enzyme.

6. When Used:

Cereals: 4 leaf to flag leaf stage.

Weeds: 2 - 4 leaf stage.

7. How to Apply:

With: Ground equipment only. With sprayer that can apply 45 L/ac spray solution because lower water volume may cause mixing problems and/or unacceptable crop injury may occur.

Rate:

Attain A: 240 mL/ac.

Attain B: 400 mL/ac.

Water volume: 45 L/ac.

Pressure: 135 - 270 kPa.

Nozzles: Flat fan type. Use 50 mesh or larger screens.

Mixing instructions: Only use in sprayers with good agitation. Ensure sprayer is properly cleaned prior to applying Attain.

1. Fill the sprayer with ½ the required amount of water, start agitation and continue agitation throughout the mixing and spraying procedure.
2. Add required number of jugs of Attain A, then Attain B.
3. Complete filling the sprayer tank.

Attain (cont'd)

8. **Application Tips:** Attain activity is influenced by weather conditions. Optimum activity requires active weed growth. Temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, e.g., heat, drought or cold or if weeds have initiated flowering or if heavy infestations exist. Wet foliage at time of application may result in reduced weed control. Optimum timing of application is 2 - 4 leaf stage of weeds. Application on cleavers can be made up to 6 whorl (20 cm height) stage. Do not apply to wheat and barley underseeded to legumes. Make only one application per year. Application prior to 4 leaf stage of wheat and barley may cause severe twisting of leaves and leaf stem and head deformities which may reduce yield up to 10%. Do not apply later than flag leaf stage of crop. Some twisting may be evident 1 week after application on barley. This twisting is transitory and will disappear within 3 weeks.
9. **How it Works:** Attain herbicide tank mix is non residual. The components of Attain tank mix move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.
10. **Expected Results:**

    Broadleaf weeds: Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.
11. **Effects of Rainfall:** Do not apply if rain is expected in 1 hour.
12. **Movement in Soil:** 2,4-D and fluroxypyr bind lightly to soil organic matter but do not bind readily to sand, silt or clay. Due to their relatively short half life, they rarely move deeper than 15 cm deep in soil.
13. **Grazing and Cropping Restrictions:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut for hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days prior to slaughter. Do not harvest the treated mature crop within 60 days after application.

    Succeeding crops: Fields previously treated with Attain herbicide tank mix can be seeded the following year to wheat, barley, oats, rye forage grasses, flax, lentils, peas, canola and mustard, or fields can be summer fallowed. Do not seed crops other than those listed above for at least one year following treatment.

    Drift: Broadleaf crops are sensitive to spray drift. Minimize drift by using nozzles that put out sufficient spray volume and large droplets.
14. **Toxicity:** 2,4-D has moderate acute mammalian toxicity. Acute oral LD_{50} rate mg/kg = technical (639-764). Fluroxypyr has very low mammalian toxicology. Acute oral LD_{50} >2000 mg/kg.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a dry heated area. If product is frozen, bring to room temperature and agitate before use.
17. **Resistance Management:** Natural populations of certain weeds have developed resistance to some herbicides. To delay the selection of resistant weed populations, rotate the use of herbicides with different modes of action. Attain herbicide tank mix can be used in a weed resistance management program to delay selection for kochia, chickweed or other susceptible weeds resistant to Group 2 herbicides that inhibit the ALS/AHAS enzyme.

M121

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Avadex BW/MicroActiv *(triallate)*

Group 8

Manufacturer: **Monsanto Canada Inc.**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; Avadex BW/MicroActiv Liquid; 400 g/L; 22.7 L pail. Granular; Avadex BW/MicroActiv Granular; 10%; 22.7 kg bags.
2. **Registered Mixes:** Rival or Treflan (barley, wheat), dry bulk or liquid fertilizers.

   Mixing instructions: Thorough mixing is essential. Agitation is required to suspend mixture or to resuspend if spray mixture is allowed to settle at any time.

   Mixing restrictions: Do not mix with nitrate fertilizers, they may cause explosions and fires.
3. **Crops:**

   barley (8.9)
   flax (8.9)
   mustard (9.0)
   peas (field)(9.0)
   rapeseed (8.2)
   sugar beets (8.0)
   wheat (8.3) (durum, spring)

   Underseeding: Alfalfa, bird's-foot trefoil, clovers; provided they are not harvested for green feed, silage or hay in year of seeding. Do not underseed with grasses or legume-grass mix.
4. **Weeds Controlled:** wild oats (7.6).
5. **Weeds Suppressed:** None.
6. **When Used:**

   Spring: Pre-plant incorporated on flax, mustard, peas, rapeseed, sugar beets. Pre-plant and post-plant incorporated on barley and wheat. Do not apply pre-plant with wheat in soils with 4% or less organic matter where discers are to be used for the seeding operation. Seed to the proper depth immediately or up to 3 weeks after application.

   Fall: All crops. Granules: September 15 to freeze-up. Liquid: October 1 to freeze-up.

   Note: For fall applications: where erosion may be a problem, maximize crop residue cover with only one fall tillage incorporation.
7. **How to Apply:**

   With: Aircraft (granules only) or ground equipment.

   Rate:

(A) Spring application

		Organic matter			
		4% or Less		Greater than 4%	
Crops	Application timing	Liquid L/ac	Granules kg/ac	Liquid L/ac	Granules kg/ac
Barley	Before and after seeding	1.4	5.7	1.7	6.9
Flax, mustard, rapeseed, sugar beets	Before seeding	1.7	6.9	2.2	8.9
Peas (dry)	Before seeding	1.7	NR*	1.7	NR
Wheat (durum, spring)	Before seeding	1.2	4.4	1.4	5.7
	After seeding	1.4	5.7	1.7	6.9

* NR – Not Registered

Avadex BW/MicroActiv *(triallate)*

Group 8

Manufacturer: **Monsanto Canada Inc.**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; Avadex BW/MicroActiv Liquid; 400 g/L; 22.7 L pail. Granular; Avadex BW/MicroActiv Granular; 10%; 22.7 kg bags.
2. **Registered Mixes:** Rival or Treflan (barley, wheat), dry bulk or liquid fertilizers.

   Mixing instructions: Thorough mixing is essential. Agitation is required to suspend mixture or to resuspend if spray mixture is allowed to settle at any time.

   Mixing restrictions: Do not mix with nitrate fertilizers, they may cause explosions and fires.
3. **Crops:**

   barley (8.9)
   flax (8.9)
   mustard (9.0)
   peas (field)(9.0)
   rapeseed (8.2)
   sugar beets (8.0)
   wheat (8.3) (durum, spring)

   Underseeding: Alfalfa, bird's-foot trefoil, clovers; provided they are not harvested for green feed, silage or hay in year of seeding. Do not underseed with grasses or legume-grass mix.
4. **Weeds Controlled:** wild oats (7.6).
5. **Weeds Suppressed:** None.
6. **When Used:**

   Spring: Pre-plant incorporated on flax, mustard, peas, rapeseed, sugar beets. Pre-plant and post-plant incorporated on barley and wheat. Do not apply pre-plant with wheat in soils with 4% or less organic matter where discers are to be used for the seeding operation. Seed to the proper depth immediately or up to 3 weeks after application.

   Fall: All crops. Granules: September 15 to freeze-up. Liquid: October 1 to freeze-up.

   Note: For fall applications: where erosion may be a problem, maximize crop residue cover with only one fall tillage incorporation.
7. **How to Apply:**

   With: Aircraft (granules only) or ground equipment.

   Rate:

(A) Spring application

		Organic matter			
		4% or Less		**Greater than 4%**	
Crops	**Application timing**	**Liquid L/ac**	**Granules kg/ac**	**Liquid L/ac**	**Granules kg/ac**
Barley	Before and after seeding	1.4	5.7	1.7	6.9
Flax, mustard, rapeseed, sugar beets	Before seeding	1.7	6.9	2.2	8.9
Peas (dry)	Before seeding	1.7	NR*	1.7	NR
Wheat (durum, spring)	Before seeding	1.2	4.4	1.4	5.7
	After seeding	1.4	5.7	1.7	6.9

* NR – Not Registered

Avadex BW/MicroActiv (cont'd)

(B) Fall application – fall incorporated

	Organic matter					
Crops	Less than 2%		2 - 4%		Greater than 4%	
	Liquid L/ac	Granules kg/ac	Liquid L/ac	Granules kg/ac	Liquid L/ac	Granules kg/ac
Barley	1.2	4.4	1.4	5.7	1.7	6.9
Flax, mustard, rapeseed, sugar beets	1.4	5.7	1.7	6.9	2.2	8.9
Wheat (durum, spring)	1.2	4.4	1.4	5.7	1.7	6.9
(C) Minimum tillage – fall or spring minimum tillage						
Barley	--	–	–	5.7	–	6.9
Flax, mustard, rapeseed, sugar beets	–	–	–	6.9	–	8.9
Wheat (durum, spring)	–	–	–	5.7	–	6.9

Water volume: Liquid formulation only: 36 L/ac minimum.

Pressure: Liquid formulation only: 200 kPa.

Nozzles: Flat fan recommended.

Incorporation:

Avadex BW/MicroActiv in conventional tillage systems: Two incorporation operations are necessary for thorough mixing. For application made prior to seeding, incorporation with disc plus harrows or field cultivator plus harrows is recommended. The second incorporation should be at right angle to first, with suitable disc or cultivator type implement. For application made after seeding, shallowly incorporate to a depth of 4 - 5 cm using suitable equipment such as harrow. The second incorporation can be conducted any time prior to crop emergence. Adjust incorporation equipment to a depth that will not disturb the seed. Do not incorporate more than 5 cm. This can be accomplished by setting the tillage equipment to work the soil no deeper than 7.5 cm - 10 cm. Shallow incorporation is necessary to prevent dilution of the product, thus decreasing wild oat control and increasing the risk of crop injury.

Liquid: The first incorporation should be completed as soon as possible on the day of spraying.

Granules: The first incorporation should be completed within 48 hours of application. The second incorporation for both liquid and granules may or may not be done immediately after the first. For maximum results from spring application of granules, delay second incorporation for at least 3 - 5 days.

Avadex BW/MicroActiv + fertilizer banding: Avadex BW/MicroActiv may be broadcast prior to or in conjunction with fall fertilizer banding. Banding unit should be operated at no less than 8 km/h to provide adequate soil mixing. Depth of operation of banding unit should be as recommended for proper fertilizer placement. An effective shank spacing of 30 cm or less will provide optimum results.

Spring application: If Avadex BW/MicroActiv is applied in the spring prior to banding unit operated using knife-type openers, two additional incorporations are required at right angles.

Fall application: The use of tine harrow on banding unit is not required but may provide superior incorporation where excessive trash is not a factor. The second incorporation should be at right angle to the banding operation with suitable disc or cultivator type implement.

Avadex BW/MicroActov in high disturbance systems (minimum tillage): A high disturbance incorporation can be conducted prior to seeding or as part of the seeding operation. A high disturbance system is one that disturbs the soil enough so that emerged weeds are controlled by the tillage. (High disturbance may be caused by the seed drill – cultivator or disc type, or with harrows following the seed drill or both.) Levelling the soil at or after seeding with harrows will ensure uniform product coverage and best performance. Application of granules 10 - 14 days prior to incorporation is rquired for best results.

8. Application Tips:

Choice of formulation: Use liquid formulation on soil free of trash. Use granules on all soils including those with heavy trash cover. Granules may be applied in the fall prior to or in conjunction with fertilizer banding.

Avadex BW/MicroActiv (cont'd)

(B) Fall application – fall incorporation						
			Organic matter			
Crops	Less than [illegible]%		[illegible]%		Greater than [illegible]%	
	Liquid	Granules	Liquid	Granules	Liquid	Granules
	L/ac	kg/ac	L/ac	kg/ac	L/ac	kg/ac
Barley	1.2	4.4	1.4	5.7	1.7	6.9
Flax, mustard, rapeseed, sugar beets	1.4	5.7	1.7	6.9	2.2	8.9
Wheat (durum, spring)	1.2	4.4	1.4	5.7	1.7	6.9
(C) [illegible] tillage – fall or spring [illegible] tillage						
Barley	–	–	–	5.7	–	6.9
Flax, mustard, rapeseed, sugar beets	–	–	–	6.9	–	8.9
Wheat (durum, spring)	–	–	–	5.7	–	6.9

Water volume: Liquid formulation only: 36 L/ac minimum.

Pressure: Liquid formulation only: 200 kPa.

Nozzles: Flat fan recommended.

Incorporation:

Avadex BW/MicroActiv in conventional tillage systems: Two incorporation operations are necessary for thorough mixing. For application made prior to seeding, incorporation with disc plus harrows or field cultivator plus harrows is recommended. The second incorporation should be at right angle to first, with suitable disc or cultivator type implement. For application made after seeding, shallowly incorporate to a depth of 4 - 5 cm using suitable equipment such as harrow. The second incorporation can be conducted any time prior to crop emergence. Adjust incorporation equipment to a depth that will not disturb the seed. Do not incorporate more than 5 cm. This can be accomplished by setting the tillage equipment to work the soil no deeper than 7.5 cm - 10 cm. Shallow incorporation is necessary to prevent dilution of the product, thus decreasing wild oat control and increasing the risk of crop injury.

Liquid: The first incorporation should be completed as soon as possible on the day of spraying.

Granules: The first incorporation should be completed within 48 hours of application. The second incorporation for both liquid and granules may or may not be done immediately after the first. For maximum results from spring application of granules, delay second incorporation for at least 3 - 5 days.

Avadex BW/MicroActiv + fertilizer banding: Avadex BW/MicroActiv may be broadcast prior to or in conjunction with fall fertilizer banding. Banding unit should be operated at no less than 8 km/h to provide adequate soil mixing. Depth of operation of banding unit should be as recommended for proper fertilizer placement. An effective shank spacing of 30 cm or less will provide optimum results.

Spring application: If Avadex BW/MicroActiv is applied in the spring prior to banding unit operated using knife-type openers, two additional incorporations are required at right angles.

Fall application: The use of tine harrow on banding unit is not required but may provide superior incorporation where excessive trash is not a factor. The second incorporation should be at right angle to the banding operation with suitable disc or cultivator type implement.

Avadex BW/MicroActov in high disturbance systems (minimum tillage): A high disturbance incorporation can be conducted prior to seeding or as part of the seeding operation. A high disturbance system is one that disturbs the soil enough so that emerged weeds are controlled by the tillage. (High disturbance may be caused by the seed drill – cultivator or disc type, or with harrows following the seed drill or both.) Levelling the soil at or after seeding with harrows will ensure uniform product coverage and best performance. Application of granules 10 - 14 days prior to incorporation is rquired for best results.

8. Application Tips:

Choice of formulation: Use liquid formulation on soil free of trash. Use granules on all soils including those with heavy trash cover. Granules may be applied in the fall prior to or in conjunction with fertilizer banding.

Minimum Tillage:

Fall minimum tillage application: fall minimum tillage applications should be made when the average soil temperature at the 5 cm depth is 4°C or less and within 3 weeks of soil freeze up. This situation generally occurs by Oct. 1. No fall incorporation is required. Incorporation may be conducted in the spring prior to seeding or at seeding. Do not use this treatment on soil with less than 2% organic matter. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the incorporated treatments only.

Spring minimum tillage application: Apply Avadex BW/MicroActiv granules in the spring when average soil temperature at the 5 cm depth is 4°C or less. Applications should be made to soil which have adequate trash cover to prevent soil erosion between application and seeding. Ensure that the time between application and incorporation is a minimum of 10 - 14 days. Do not apply more than 4 weeks before intended seeding.
For optimum results with Avadex BW minimum tillage treatments, seed when wild oat growth is noticeable in the field. This will ensure that the soil is warm enough for activation of Avadex BW. Minimum tillage applications should not be made to fields covered with snow or excessive crop residue that will not allow granule contact with soil. If excessive crop residue exists at the time of application, a vigorous harrowing can be used to ensure that the herbicide granules make adequate contact with the soil. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the incorporated treatment only. Soil colour may not be a precise indicator of organic matter content. Ensure that the application rate chosen from the table is appropriate for your soil type.

Field preparation: Make sure the soil is in good working condition. Reduce trash to an acceptable level before application. If soil is excessively wet or lumpy, cultivate with suitable equipment to improve soil condition.

Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 6.0 - 7.5 cm. Wheat must be seeded below the treated layer. After seeding, any deep ridges left by drills must be levelled by harrowing. Treflan/Rival Mixes: Drought conditions in the year of treatment may result in higher levels of Treflan/Rival carry over. To avoid wheat injury, seed 6.0 - 7.5 cm into warm, moist seedbed.

9. **How it Works:** Absorbed by wild oat shoots, usually resulting in death before emergence. Under dry conditions, wild oats may emerge before being killed.

10. **Expected Results:**

Wild oats: Usually kills wild oats before they emerge. Scraping away the soil 1 - 2 weeks following treatment will expose white to yellow wild oats shoots 2.0 - 2.5 cm in length with pinched tips. Plants which have emerged and absorbed a lethal dose will cease growth, leaves become brittle and bluish-green in color. Under dry conditions, a rainfall of 1.5 cm or more when wild oats are emerging can cause post-emergent die-back of a high percentage of wild oat plants.

Crop: Wheat seeded into the treatment zone under very dry soil conditions may be thinned and delayed when germinating and emerging just prior to a heavy rainfall. Wheat must be seeded at least 1.5 cm below the treated layer of soil (e.g., 5 - 7.5 cm). Some wheat thinning may be noted on eroded knolls. **Poor results may be expected if** incomplete incorporation due to wet, cloddy soil or heavy trash, incorporation delayed, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

11. **Effects of Rainfall:** Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance.

12. **Movement in Soil:** Negligible.

13. **Grazing and Cropping Restrictions:**

Drift: No effect on standing crops.

Grazing restrictions: Treated underseeded legumes cannot be harvested for green feed, silage or hay in year of seeding. Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

Succeeding crops: Oats should not be seeded into soil treated with Avadex BW in the previous year.

Avadex BW/MicroActiv (cont'd)

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,675 - 2,165). May cause slight eye irritation. Slightly toxic to fish. Non-toxic to birds.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store above 0°C. If frozen, warm to 22°C and agitate to redissolve crystals.
17. **Resistance Management:** Populations of wild oats tolerant to Avadex BW/MicroActiv (triallate) have developed in a few fields in Alberta that have had a long history of repeated Avadex BW/MicroActiv use. Triallate containing products (e.g., Avadex BW/MicroActiv, Fortress) will not control triallate tolerant wild oats. To delay selection or reduce the spread of triallate tolerant wild oats, avoid repeated use of Avadex BW/MicroActiv or Fortress in the same field.

Avenge 200-C *(difenzoquat)*

Group 8

Manufacturer: **Cyanamid Crop Protection**

WARNING POISON

1. **Formulations:** Liquid; Avenge 200-C; 200 g/L; 20 L pail.
2. **Registered Mixes:** Accord^{5}, Accord + Refine Extra^{5}, Accord + Buctril M^{5}, Accord + 2,4-D Ester^{5}, Accord + MCPA Ester^{5}, Ally^{1,6}, Buctril M^{1,2}, 2,4-D ester^{6}, 2,4-DB^{1,3} (Embutox 625^{1,3},Caliber 400^{1}, Cobutox 400^{1,3}, 2,4-D Butryic 400^{1,3}), clean crop^{1} (Diphenoprop 600^{1}, Estaprop^{1}, Turboprop 600^{1}, Dichlorprop-D^{1}, Interprop^{1}), Laser^{4}, Pardner^{1,2}, Refine Extra^{1}, Curtail M^{1}, Thumper^{1}.

   1 = Avenge wheat varieties and barley, 2 = canary grass, 3 = Avenge wheat varieties and barley underseeded to forages, 4 = Avenge hard red spring wheat varieties only, 5 = Avenge spring wheat varieties, 6 = do not apply to canary grass

   Mixing instructions: Fill tank 1/2 - 3/4 full with water; start agitation. If mixing with Ally or Refine Extra, add the Ally or Refine Extra to the tank and continue agitation, mixing thoroughly to ensure product is completely dissolved. Add Avenge to the partially filled tank while agitating. If using a liquid broadleaf herbicide in the tank mix, add to the tank. Fill remainder of the tank with water and agitate, or cycle at least five minutes before spraying to ensure thorough mixing. Continue agitation until spraying is complete.

   Mixing restrictions: Do **not** mix or spray within 5 days any formulation containing MCPA amine, Banvel, Dyvel, Target, 2,4-D amine or Blagal.
3. **Crops:**

   Barley (8.7): All varieties.
   Canary grass (8.4).
   Fall rye (8.6): Cougar, Frontier, Kodiak, Puma, Rymin.
   Spring wheat (8.4): Use only on the following varieties: Biggar, Bluesky, Columbus, Conway, Fielder, Genesis, Glenlea, Katepwa, Kenyon, Lancer, Leader, Neepawa, Oslo, Pasqua, Selkirk, Wildcat, CDC Macua, CDC Teal, Cutler.
   Triticale (9.0): Carman, Welsh.
   Winter wheat (8.7): Norstar.
   Forages underseeded to wheat or barley: Alfalfa (7.9), bird's-foot trefoil, bromegrass(7.9), clover [red (7.2), sweet (7.6)], crested wheatgrass (7.0), fescue [creeping red (7.8), red, meadow (7.4)], Kentucky bluegrass, orchard grass (7.8), reed canary grass (7.0), Russian wild ryegrass (6.5), timothy (5.1). Do not treat underseeded legumes if they are to be grazed or used for feed.
   Seedling grasses for forage: Meadow foxtail, wheatgrass (tall, streambank, pubescent), tall fescue, meadow bromegrass.

4. **Weeds Controlled:** Wild oats (7.5).

5. **Weeds Suppressed:** None.

6. **When Used:** 3 - 5 leaf stage of wild oats. Very good control at 4 - 5 leaf stage but yield increases may be reduced. 3 - 4 leaf stage to minimize early wild oat competition, and maximize yield increases. Do not apply to barley, wheat or canary seed after 6 leaf stage of crop. Use Avenge + Ally on soils with a pH of 7.5 or lower. In seedling grasses for forage: apply up to 3 leaf stage of wild oats.

7. **How to Apply:**

   With: Aircraft or ground equipment. Do not apply Ally, Laser, Buctril M, Curtail M, Pardner, Embutox 625, Estaprop, Refine Extra, Accord and Accord tank mixes by air.

   Rate:

Wild oat infestation level	[illegible]
1 - 200 plants/m^2	1.4 L/ac
Over 200 plants/m^2	1.7 L/ac

   Mixing rates: MCPA ester (500 g/L): Up to 0.45 L/ac. 2,4-D ester (570 g/L): Up to 0.4 L/ac. Ally: Use high rate of Avenge. **Others:** Label recommended rate.

   Water volume: Air: 8 L/ac minimum; Ground: 40 L/ac; Spra-Coupe: 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended; tilted 45° forward for better spray penetration. 50 mesh metal screens and filters.

   Incorporation: Not applicable.

8. **Application Tips:** Do not apply if the crop is stressed from extreme drought or excessive moisture. Do not spray if freezing temperatures are forecast. Avenge can be sprayed if leaf surface is wet, as long as the spray solution will not drip off the leaf surface after application. Apply a minimum of 30 days after seeding for best results.

9. **How it Works:** Acts on the growing point located at or just above the soil surface; placing herbicide at or below this point is most efficient. Disrupts cell division and elongation causing growth to stop. Best at high temperature and humidity.

10. **Expected Results:**

    Wild oats: Start to yellow within 3 - 5 days. Effect is faster when temperature and humidity are high. Affected plants will turn brown or remain stunted and partially green throughout the season but competitive effect will be removed. Wild oats in the 1 - 2 leaf stage at spraying or those that emerge after spraying will be unaffected.

    Crop: Slight yellowing may be visible 5 - 7 days after application and will remain visible for 2 weeks. **Poor results may be expected if** spraying before 3 leaf stage; too low a rate for wild oat population; inadequate coverage due to dense broadleaf weeds; drought or temperature stress.

11. **Effects of Rainfall:** Do not spray if rainfall is forecast within 6 hours of application.

12. **Movement in Soil:** Is strongly absorbed to soil particles, is not leached nor carried in runoff appreciably.

13. **Grazing and Cropping Restrictions:**

    Drift: Only oats can be seriously affected by drift.

    Grazing Restrictions: Do not graze or feed crop for 8 weeks after treatment. Treated underseeded forages or seedling grasses for forage should not be grazed or harvested for feed during the year of treatment.

    Crop use after hail: Do not process for 8 weeks after treatment.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 863-912. Non-toxic to fish, birds or bees.

4. **Weeds Controlled:** Wild oats (7.5).

5. **Weeds Suppressed:** None.

6. **When Used:** 3 - 5 leaf stage of wild oats. Very good control at 4 - 5 leaf stage but yield increases may be reduced. 3 - 4 leaf stage to minimize early wild oat competition, and maximize yield increases. Do not apply to barley, wheat or canary seed after 6 leaf stage of crop. Use Avenge + Ally on soils with a pH of 7.5 or lower. In seedling grasses for forage: apply up to 3 leaf stage of wild oats.

7. **How to Apply:**

   With: Aircraft or ground equipment. Do not apply Ally, Laser, Buctril M, Curtail M, Pardner, Embutox 625, Estaprop, Refine Extra, Accord and Accord tank mixes by air.

   Rate:

Wild oat infestation level	200-C Air or ground
1 - 200 plants/m^2	1.4 L/ac
Over 200 plants/m^2	1.7 L/ac

   Mixing rates: MCPA ester (500 g/L): Up to 0.45 L/ac. 2,4-D ester (570 g/L): Up to 0.4 L/ac. Ally: Use high rate of Avenge. **Others:** Label recommended rate.

   Water volume: Air: 8 L/ac minimum; Ground: 40 L/ac; Spra-Coupe: 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended; tilted 45° forward for better spray penetration. 50 mesh metal screens and filters.

   Incorporation: Not applicable.

8. **Application Tips:** Do not apply if the crop is stressed from extreme drought or excessive moisture. Do not spray if freezing temperatures are forecast. Avenge can be sprayed if leaf surface is wet, as long as the spray solution will not drip off the leaf surface after application. Apply a minimum of 30 days after seeding for best results.

9. **How it Works:** Acts on the growing point located at or just above the soil surface; placing herbicide at or below this point is most efficient. Disrupts cell division and elongation causing growth to stop. Best at high temperature and humidity.

10. **Expected Results:**

    Wild oats: Start to yellow within 3 - 5 days. Effect is faster when temperature and humidity are high. Affected plants will turn brown or remain stunted and partially green throughout the season but competitive effect will be removed. Wild oats in the 1 - 2 leaf stage at spraying or those that emerge after spraying will be unaffected.

    Crop: Slight yellowing may be visible 5 - 7 days after application and will remain visible for 2 weeks. **Poor results may be expected if** spraying before 3 leaf stage, too low a rate for wild oat population; inadequate coverage due to dense broadleaf weeds; drought or temperature stress.

11. **Effects of Rainfall:** Do not spray if rainfall is forecast within 6 hours of application.

12. **Movement in Soil:** Is strongly absorbed to soil particles, is not leached nor carried in runoff appreciably.

13. **Grazing and Cropping Restrictions:**

    Drift: Only oats can be seriously affected by drift.

    Grazing Restrictions: Do not graze or feed crop for 8 weeks after treatment. Treated underseeded forages or seedling grasses for forage should not be grazed or harvested for feed during the year of treatment.

    Crop use after hail: Do not process for 8 weeks after treatment.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD$_{50}$ (rats) (mg/kg) = 863-912. Non-toxic to fish, birds or bees.

Avenge 200-C (cont'd)

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Headaches, tiredness and diarrhea.
16. **Storage:** Will withstand freezing temperatures, returning to full solution as temperature increases.

Banvel/Banvel II *(dicamba)*

[illegible] **Group 4**

Manufacturer **BASF**

1. **Formulations:** Solution 480 g/L; 2 x 10 L jugs; 55 L. Banvel is a 480 g/L dimethylamine salt formulation, Banvel II is a 480 g/L diglycolamine salt formulation.
2. **Registered Mixes:** Ally, 2,4-D (amine, LV ester)(not on canary seed or oats); Rustler (chemical fallow); Lexone or Sencor (barley, spring wheat); MCPA Amine (barley, canary seed, oats, seedling grasses, wheat); MCPA K-Salt (barley, oats, seedling grasses, wheat); Roundup (reduced tillage).
3. **Crops:**

barley (8.2)
canary seed
corn, field
fescue, red (seed crops)
grasses (pasture, rangeland)
non-crop areas
oats (8.6)
reduced tillage
rye, spring
stubble, summerfallow
wheat (durum, spring, winter)(8.2)

Seedling grasses

bromegrass, smooth
fescue (creeping, meadow, tall)
foxtail
orchard grass
timothy
wheatgrass (crested, intermediate, pubescent, slender, streambank, tall)

4. Weeds Controlled:

Banvel/Banvel II alone (crop rates) [illegible] mL/ac)

annual smartweeds (6.4)
Canada thistle
cleavers (at 115 mL/ac rate)
corn spurry
cow cockle (6.9)
lady's-thumb
perennial sow-thistle*
tartary buckwheat (6.7)
wild buckwheat (7.9)

* Top growth only.

Banvel/Banvel II + 2,4-D (crop rates) [illegible] Banvel/Banvel II + MCPA (crop rates)

burdock
common ragweed
false ragweed
flixweed
giant ragweed
hare's-ear mustard
hemp-nettle*
Indian mustard
kochia
lady's-thumb
lamb's-quarters
prostate pigweed
redroot pigweed
Russian pigweed
Russian thistle
stinkweed
tartary buckwheat
tumble mustard
wild buckwheat
volunteer canola
volunteer cow cockle
volunteer shepherd's-purse
volunteer sunflower
wild mustard
wild radish
wormseed mustard

* Banvel/Banvel II + MCPA only.

Banvel/Banvel II alone (pasture [illegible])

Lower rate (0.67 L/ac)
Canada thistle
English daisy
field bindweed
goldenrod
perennial sow-thistle
tansy ragwort

Higher rate (1.9 L/ac)
diffuse knapweed
goat's-beard
ground cherry
pasture sage
poverty weed
sheep sorrel
thyme-leaved spurge

Banvel/Banvel II + Roundup [illegible]

cleavers (1 - 4 whorls)***
cow cockle (8.6)
flixweed**
green foxtail (8.5)
kochia
lady's-thumb
lamb's-quarters
Persian darnel*
Russian thistle (8.0)
smartweed*
stinkweed (9.0)
volunteer brome
volunteer cereals
volunteer downy*
volunteer rapeseed (incl. canola)
wild buckwheat*
wild mustard (8.9)
wild oats (8.4)

* Preseeding applications prior to direct seeding only.
** For flixweed, use 400 mL/ac rate of Round-up.
*** Suppression

Banvel/Banvel II + 2,4-D [illegible]

alder
aspen poplar
cherry
western snowberry
wild rose
wolf willow

5. **Weeds Suppressed:** Controls top growth of Canada thistle and perennial sow-thistle and suppresses cleavers at in-crop rates. Top growth control of curled dock at lower pasture rate. Banvel/Banvel II + Roundup suppresses redroot pigweed, foxtail barley and wild buckwheat. Banvel/Banvel II + 2,4-D on reduced tillage controls top growth of Canada thistle and perennial sow-thistle. Apply Banvel/Banvel II at 240 mL/ac + 600 mL of 2,4-D amine in the spring for suppression of volunteer alfalfa in established grass pasture.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Headaches, tiredness and diarrhea.

16. **Storage:** Will withstand freezing temperatures, returning to full solution as temperature increases.

Banvel/Banvel II *(dicamba)*

Manufacturer: **BASF**

Group 4

1. **Formulations:** Solution 480 g/L; 2 x 10 L jugs; 55 L. Banvel is a 480 g/L dimethylamine salt formulation. Banvel II is a 480 g/L diglycolamine salt formulation.
2. **Registered Mixes:** Ally, 2,4-D (amine, LV ester)(not on canary seed or oats); Rustler (chemical fallow); Lexone or Sencor (barley, spring wheat); MCPA Amine (barley, canary seed, oats, seedling grasses, wheat); MCPA K-Salt (barley, oats, seedling grasses, wheat); Roundup (reduced tillage).
3. **Crops:**

barley (8.2)
canary seed
corn, field
fescue, red (seed crops)
grasses (pasture, rangeland)
non-crop areas
oats (8.6)
reduced tillage
rye, spring
stubble, summerfallow
wheat (durum, spring, winter)(8.2)

Seedling grasses

bromegrass, smooth
fescue (creeping, meadow, tall)
foxtail
orchard grass
timothy
wheatgrass (crested, intermediate, pubescent, slender, streambank, tall)

4. Weeds Controlled:

Banvel/Banvel II alone (crop rates): 95 - 115 mL/ac

annual smartweeds (6.4)
Canada thistle
cleavers (at 115 mL/ac rate)
corn spurry
cow cockle (6.9)
lady's-thumb
perennial sow-thistle*
tartary buckwheat (6.7)
wild buckwheat (7.9)

* Top growth only.

Banvel/Banvel II + 2,4-D (crops rates, reduced tillage), Banvel/Banvel II + MCPA (crop rates)

burdock
common ragweed
false ragweed
flixweed
giant ragweed
hare's-ear mustard
hemp-nettle*
Indian mustard
kochia
lady's-thumb
lamb's-quarters
prostate pigweed
redroot pigweed
Russian pigweed
Russian thistle
stinkweed
tartary buckwheat
tumble mustard
wild buckwheat
volunteer canola
volunteer cow cockle
volunteer shepherd's-purse
volunteer sunflower
wild mustard
wild radish
wormseed mustard

* Banvel/Banvel II + MCPA only.

Banvel/Banvel II alone (pasture, rangeland, non-crop areas; 2 rates)

Lower rate (0.67 L/ac)
Canada thistle
English daisy
field bindweed
goldenrod
perennial sow-thistle
tansy ragwort

Higher rate (1.9 L/ac)
diffuse knapweed
goat's-beard
ground cherry
pasture sage
poverty weed
sheep sorrel
thyme-leaved spurge

Banvel/Banvel II + Roundup (reduced tillage, preseeding in direct seeding)

cleavers (1 - 4 whorls)***
cow cockle (8.6)
flixweed**
green foxtail (8.5)
kochia
lady's-thumb
lamb's-quarters
Persian darnel*
Russian thistle (8.0)
smartweed*
stinkweed (9.0)
volunteer brome
volunteer cereals
volunteer downy*
volunteer rapeseed (incl. canola)
wild buckwheat*
wild mustard (8.9)
wild oats (8.4)

* Preseeding applications prior to direct seeding only.
** For flixweed, use 400 mL/ac rate of Round-up.
*** Suppression

Banvel/Banvel II + 2,4-D (brush)

alder
aspen poplar
cherry
western snowberry
wild rose
wolf willow

5. Weeds Suppressed: Controls top growth of Canada thistle and perennial sow-thistle and suppresses cleavers at in-crop rates. Top growth control of curled dock at lower pasture rate. Banvel/Banvel II + Roundup suppresses redroot pigweed, foxtail barley and wild buckwheat. Banvel/Banvel II + 2,4-D on reduced tillage controls top growth of Canada thistle and perennial sow-thistle. Apply Banvel/Banvel II at 240 mL/ac + 600 mL of 2,4-D amine in the spring for suppression of volunteer alfalfa in established grass pasture.

Banvel/Banvel II (cont'd)

6. When Used:

Summerfallow: Banvel/Banvel II alone for Canada thistle rosette only, cultivate in the early spring and continue as required. Final cultivation must occur by the end of July (between July 15 and August 1). To encourage rosette formation, the final cultivation should cut the thistles off at 5 - 7.5 cm below the soil surface. Under normal growing conditions, regrowth of Canada thistle should take 3 - 4 weeks. Apply Banvel/Banvel II at least 2 weeks prior to a killing frost when the majority of Canada thistle plants are in the rosette stage and 15 - 25 cm in diameter. Resume cultivation 3 weeks after treatment. For maximum control, use Banvel/Banvel II in a cereal crop the following year at the recommended crop stage and rate.

Banvel/Banvel II + Roundup: For Canada thistle and/or perennial sow-thistle only, perform the final tillage operation the last week of July or first week of August. Allow thistles to regrow for a minimum of 4 weeks and apply when the majority of thistles have emerged. Apply before thistles reach early bud stage (15 - 25 cm tall).

Stubble: Banvel/Banvel II alone or Banvel/Banvel II + Roundup. When thistle regrowth is 10 - 15 cm tall. Apply 2 weeks prior to first killing frost.

Pastures, rangeland grasses: When weeds are actively growing or brush species are under 2 m tall.

Reduced tillage for annual weeds, summerfallow: Banvel/Banvel II + Roundup on actively growing weeds from 8 - 15 cm tall. Banvel/Banvel II + 2,4-D on actively-growing weeds at the 2 - 4 leaf stage.

Preseeding application in direct seeding: Banvel/Banvel II + Roundup may be applied to emerging annual grasses and broadleaf weeds in direct seeding systems prior to seeding wheat, barley, oats and field corn (not sweet corn). Planting should follow soon after application since this tank mix does not provide residual weed control. Delayed planting following application will allow weeds to emerge between application and crop emergence.

Cleavers: Spray before 3 whorl stage for better control.

	Recommended leaf stage or height of crop:					
Banvel/II crop	**Banvel/II alone**	**Banvel/II + 2,4-D Amine-500**	**Banvel/II + MCPA Amine-500**	**Banvel/II + MCPA K-400**	**Banvel/II + Metribuzin**	**Banvel/II + Ally****
Barley	2 - 5	2 - 5	2 - 5	2 - 5	2 - 3	2 - 5
Canary seed	3 - 5	NR*	3 - 5	NR	NR	NR
Corn (post-emergent)	up to 20 cm	up to 10 cm	NR	NR	NR	NR
Corn (drop nozzles)	20 - 50 cm	10 - 50 cm	NR	NR	NR	NR
Fescue (red) seedling	5 cm tall	5 cm tall	NR	NR	NR	NR
Fescue (red) established	up to flag leaf	up to flag leaf	NR	NR	NR	NR
Oats	2 - 5	NR	2 - 5	2 - 5	NR	NR
Rye (spring)	2 - 3	2 - 3	NR	NR	NR	NR
Seedling grasses	2 - 4	2 - 4	2 - 4	2 - 4	NR	NR
Wheat (spring)	2 - 5	2 - 5	2 - 5	2 - 5	2 - 3	2 - 5
Wheat (durum)	2 - 5	2 - 5	2 - 5	2 - 5	NR	NR
Wheat (winter)	15 - 25 cm	15 - 25 cm	15 - 25 cm	15 - 25 cm	NR	NR

* NR – Not Registered

** Do not use surfactant.

7. How to Apply:

With: Aircraft or ground equipment.

Water volume: Air: 8 L/ac minimum. Ground: Cereals, seed grasses: 45 L/ac. Corn: 90 - 140 L/ac. Summerfallow/stubble (thistles): 45 - 90 L/ac. Reduced Tillage: 20 - 40 L/ac. Pastures, Rangeland Grasses: 45 - 90 L/ac. Preseeding application prior to direct seeding: 40 L/ac.

Pressure: Air: not above 200 kPa. Ground: 275 kPa.

Nozzles: Flat fan recommended.

Rate:

Air: (Banvel/Banvel II or Banvel/Banvel II + phenoxy mixes only). Apply only 95 mL/ac of Banvel/Banvel II by air.

Ground: See table.

Banvel/Banvel II 480 g/L formulation

Crop	**Banvel/II alone mL/ac**	**Banvel/II + 2,4-D Amine-500 mL/ac + mL/ac**	**Banvel/II + MCPA Amine-500 mL/ac + mL/ac**	**Banvel/II + MCPA K-400 mL/ac + mL/ac**	**Banvel/II + Metribuzin (Sencor or Lexone DF) mL/ac + (mL/ac or g/ac)**	**Banvel/II + Ally mL/ac + g/ac**
Barley	95	95 + 340	95 + 340	95 + 445	95 + 110 - 170 or 110	95 + 2
Canary seed	115	NR*	115 + 340	NR	NR	NR
Corn (field)	245 - 500	115 + 340	NR	NR	NR	NR
Fescue (red)	245	245 + 600	NR	NR	NR	NR
Oats	95 - 115	NR	95 - 115 + 340	95 - 115 + 445	NR	NR
Rye (spring)	95 - 115	95 - 115 + 340	NR	NR	NR	NR
Seedling grasses	95 - 115	95 - 115 + 340	95 - 115 + 340	95 - 115 + 445	NR	NR
Wheat (spring)	95 - 115	95 - 115 + 340	95 - 115 + 340	95 - 115 + 445	95 + 110 - 170 or 110	95 + 2
Wheat (durum, winter)	95 - 115	95 - 115 + 340	95 - 115 + 340	95 - 115 + 445	NR	NR

*NR – Not Registered.

Other uses	**Banvel/II alone L/ac**	**Banvel/II + 2,4-D Amine-500 rate/ac**	**Banvel/II + 2,4-D L.V. Ester-600 rate/ac**	**Banvel/II + Roundup + non-ionic surfactant mL/ac**
Fallow: thistle rosette	0.5 L	NR	NR	NR
Fallow/stubble: thistles	1.0 L	NR	NR	510 + 690 + 142
Reduced tillage	NR	95 - 115 mL + 445 mL	95 - 115 mL + 370 mL	(115 - 245) + (305 - 400) + 142
Pastures/range: weeds	0.67 L - 1.9 L	0.67 L + 0.90 L	0.67 L + 0.75 L	NR
Pastures/range: brush	NR	2.1 L + 4.0 L in 1000 L water	2.1 L + 3.3 L in 1000 L water	NR
Pastures (vol. alfalfa)	NR	240 mL + 600 mL	NR	NR
Preseeding (direct seeding)	NR	NR	NR	125 + 375 + 0.5% v/v

Brush species	**Broadcast application of Banvel/Banvel II + 2,4-D in 90 - 130 L/ac of water**
Aspen poplar	1.3 L/ac + 1.7 L/ac 2,4-D Amine-500 **or** 1.5 L/ac 2,4-D Ester-600
Wild rose	1.5 L/ac + 1.7 L/ac 2,4-D Amine-500 **or** 1.5 L/ac 2,4-D Ester-600
Western snowberry	1.5 L/ac + 1.5 L/ac 2,4-D Ester-600

8. **Application Tips:** Best when crop is under good growing conditions and air temperature 10 - 25 C. Avoid application when crop is under stress from adverse environmental conditions. Do not spray if risk of frost or severe drop in night temperature is forecast. Do not use on bentgrass. Apply only at recommended crop stage otherwise crop damage can occur.

9. **How it Works:** Absorbed through roots and leaves and translocated in phloem and xylem, disrupting the metabolism.

10. **Expected Results:**

    Weeds: Results may take 10 - 14 days to appear. Proliferation of tissues in plant causes twisting, bending of stem and leaf petioles; cupping of leaves; increase in root size; increase in fibrous roots.

6. When Used:

Summerfallow: Banvel/Banvel II alone for Canada thistle rosette only, cultivate in the early spring and continue as required. Final cultivation must occur by the end of July (between July 15 and August 1). To encourage rosette formation, the final cultivation should cut the thistles off at 5 - 7.5 cm below the soil surface. Under normal growing conditions, regrowth of Canada thistle should take 3 - 4 weeks. Apply Banvel/Banvel II at least 2 weeks prior to a killing frost when the majority of Canada thistle plants are in the rosette stage and 15 - 25 cm in diameter. Resume cultivation 3 weeks after treatment. For maximum control, use Banvel/Banvel II in a cereal crop the following year at the recommended crop stage and rate.

Banvel/Banvel II + Roundup: For Canada thistle and/or perennial sow-thistle only, perform the final tillage operation the last week of July or first week of August. Allow thistles to regrow for a minimum of 4 weeks and apply when the majority of thistles have emerged. Apply before thistles reach early bud stage (15 - 25 cm tall).

Stubble: Banvel/Banvel II alone or Banvel/Banvel II + Roundup. When thistle regrowth is 10 - 15 cm tall. Apply 2 weeks prior to first killing frost.

Pastures, rangeland grasses: When weeds are actively growing or brush species are under 2 m tall.

Reduced tillage for annual weeds, summerfallow: Banvel/Banvel II + Roundup on actively growing weeds from 8 - 15 cm tall. Banvel/Banvel II + 2,4-D on actively-growing weeds at the 2 - 4 leaf stage.

Preseeding application in direct seeding: Banvel/Banvel II + Roundup may be applied to emerging annual grasses and broadleaf weeds in direct seeding systems prior to seeding wheat, barley, oats and field corn (not sweet corn). Planting should follow soon after application since this tank mix does not provide residual weed control. Delayed planting following application will allow weeds to emerge between application and crop emergence.

Cleavers: Spray before 3 whorl stage for better control.

	[illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Barley	2 - 5	2 - 5	2 - 5	2 - 5	2 - 3	2 - 5
Canary seed	3 - 5	NR*	3 - 5	NR	NR	NR
Corn (post-emergent)	up to 20 cm	up to 10 cm	NR	NR	NR	NR
Corn (drop nozzles)	20 - 50 cm	10 - 50 cm	NR	NR	NR	NR
Fescue (red) seedling	5 cm tall	5 cm tall	NR	NR	NR	NR
Fescue (red) established	up to flag leaf	up to flag leaf	NR	NR	NR	NR
Oats	2 - 5	NR	2 - 5	2 - 5	NR	NR
Rye (spring)	2 - 3	2 - 3	NR	NR	NR	NR
Seedling grasses	2 - 4	2 - 4	2 - 4	2 - 4	NR	NR
Wheat (spring)	2 - 5	2 - 5	2 - 5	2 - 5	2 - 3	2 - 5
Wheat (durum)	2 - 5	2 - 5	2 - 5	2 - 5	NR	NR
Wheat (winter)	15 - 25 cm	15 - 25 cm	15 - 25 cm	15 - 25 cm	NR	NR

* NR – Not Registered

** Do not use surfactant.

7. How to Apply:

With: Aircraft or ground equipment.

Water volume: Air: 8 L/ac minimum. Ground: Cereals, seed grasses: 45 L/ac. Corn: 90 - 140 L/ac. Summerfallow/stubble (thistles): 45 - 90 L/ac. Reduced Tillage: 20 - 40 L/ac. Pastures, Rangeland Grasses: 45 - 90 L/ac. Preseeding application prior to direct seeding: 40 L/ac.

Pressure: Air: not above 200 kPa. Ground: 275 kPa.

Nozzles: Flat fan recommended.

Rate:

Air: (Banvel/Banvel II or Banvel/Banvel II + phenoxy mixes only). Apply only 95 mL/ac of Banvel/Banvel II by air.

Ground: See table.

	Banvel/Banvel II [illegible] g/L formulation					
Crop	**Banvel/II alone mL/ac**	**Banvel/II + 2,4-D Amine-500 mL/ac + mL/ac**	**Banvel/II + MCPA Amine-500 mL/ac + mL/ac**	**Banvel/II + MCPA K-400 mL/ac + mL/ac**	**Banvel/II + [illegible] ([illegible] or [illegible]) mL/ac + [illegible] or g/ac**	**Banvel/II + Ally mL/ac + g/ac**
Barley	95	95 + 340	95 + 340	[illegible]5 + 445	95 + 110 - 170 or 110	95 + 2
Canary seed	115	NR*	115 + 340	NR	NR	NR
Corn (field)	245 - 500	115 + 340	NR	NR	NR	NR
Fescue (red)	245	245 + 600	NR	NR	NR	NR
Oats	95 - 115	NR	95 - 115 + 340	95 - 115 + 445	NR	NR
Rye (spring)	95 - 115	95 - 115 + 340	NR	NR	NR	NR
Seedling grasses	95 - 115	95 - 115 + 340	95 - 115 + 340	95 - 115 + 445	NR	NR
Wheat (spring)	95 - 115	95 - 115 + 340	95 - 115 + 340	95 - 115 + 445	95 + 110 - 170 or 110	95 + 2
Wheat (durum, winter)	95 - 115	95 - 115 + 340	95 - 115 + 340	95 - 115 + 445	NR	NR

* NR – Not Registered.

Other uses	**Banvel/II alone L/ac**	**Banvel/II + 2,4-D Amine-500 mL/ac**	**Banvel/II + 2,4-D L.V. Ester-600 mL/ac**	**Banvel/II + Roundup + nonionic surfactant mL/ac**
Fallow; thistle rosette	0.5 L	NR	NR	NR
Fallow/stubble; thistles	1.0 L	NR	NR	510 + 690 + 142
Reduced tillage	NR	95 - 115 mL + 445 mL	95 - 115 mL + 370 mL	(115 - 245) + (305 - 400) + 142
Pastures/range; weeds	0.67 L - 1.9 L	0.67 L + 0.90 L	0.67 L + 0.75 L	NR
Pastures/range; brush	NR	2.1 L + 4.0 L in 1000 L water	2.1 L + 3.3 L in 1000 L water	NR
Pastures (vol. alfalfa)	NR	240 mL + 600 mL	NR	NR
Preseeding (direct seeding)	NR	NR	NR	125 + 375 + 0.5% v/v

Brush species	**Broadcast application of Banvel/Banvel II + 2,4-D in [illegible] - [illegible] L/ac of water**
Aspen poplar	1.3 L/ac + 1.7 L/ac 2,4-D Amine-500 or 1.5 L/ac 2,4-D Ester-600
Wild rose	1.5 L/ac + 1.7 L/ac 2,4-D Amine-500 or 1.5 L/ac 2,4-D Ester-600
Western snowberry	1.5 L/ac + 1.5 L/ac 2,4-D Ester-600

8. **Application Tips:** Best when crop is under good growing conditions and air temperature 10 - 25°C. Avoid application when crop is under stress from adverse environmental conditions. Do not spray if risk of frost or severe drop in night temperature is forecast. Do not use on bentgrass. Apply only at recommended crop stage otherwise crop damage can occur.
9. **How it Works:** Absorbed through roots and leaves and translocated in phloem and xylem, disrupting the metabolism.
10. **Expected Results:**

    Weeds: Results may take 10 - 14 days to appear. Proliferation of tissues in plant causes twisting, bending of stem and leaf petioles; cupping of leaves; increase in root size; increase in fibrous roots.

Banvel/Banvel II (cont'd)

Crops: Shortening of straw may occur in treated crops without adverse affects on yield. If applied at other than recommended crop stage, head and stem deformities may occur. Crops under stress from adverse environmental conditions may suffer a further setback. Crop injury may be offset by weed control obtained. **Poor results may be expected if** it rains within 4 hours, older weeds are sprayed or insufficient water.

11. **Effects of Rainfall:** Rainfall more than 4 hours after application will not reduce effectiveness.
12. **Movement in Soil:** Dicamba is more subject to leaching in sandy soils than in clay textured soils. During the growing season, the half-life of dicamba is less than 30 days.
13. **Grazing and Cropping Restrictions:**

    Drift: Can harm ornamentals and other desirable plants.

    Grazing restrictions:
    Canary seed: Use seed only as bird seed.
    Cereals, seedling grasses: Follow as per grazing and haying restrictions.
    Corn: Do not graze or harvest for silage until 7 days after Banvel/Banvel II alone or Banvel/Banvel II + 2,4-D amine; at least 12 weeks after other tank mixes.
    Pastures, Rangeland, Non-crop area (meat animals): If treated vegetation has been consumed by meat animals within 30 days of Banvel/Banvel II application, feed the animal with untreated diet for 30 days before slaughter. Meat animals may graze or feed on treated pasture 30 days after Banvel/Banvel II application without restrictions on slaughter.

    Grazing and hay restrictions (dairy cattle): (Days=time between treatment and grazing or cutting.) Up to 500 mL/ac: 0 days, 501 - 930 mL/ac: 7 days, 931 mL/ac - 1.86 L/ac: 14 days, 1.87 - 2.87 L/ac: 30 days.

    Succeeding crops: When Banvel/Banvel II is applied at 1.0 L/ac on fallow or stubble. Grow only beans (white), cereals, corn (field, sweet) or soybeans the next year. After Banvel/Banvel II (510 mL/ac) + Roundup (690 mL/ac) for thistle control, grow only beans (white), cereals, corn (field, sweet), rapeseed or soybeans. If application is after September 1 or if soil is dry subsequent to application, crop injury may occur next spring.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = formulated (2,629). May cause mild skin irritation and extreme eye irritation and swelling. Non-toxic to fish and birds.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** If frozen, shake thoroughly before use. No activity is lost if completely resuspended.

Basagran *(bentazon)*

Group 6

Manufacturer **BASF**

CAUTION POISON

1. **Formulations:** Liquid; 480 g/L; 2 x 9 L.
2. **Registered Mixes:** 2,4-D amine or ester (spring wheat only).

    Surfactants: Assist Oil Concentrate (preferred for all crops), Citowett Plus (processing peas).

3. Crops:

alfalfa[ac]
alsike clover[a]
black beans
bromegrass[b]
creeping red fescue[b]
crested wheatgrass[b]
dry beans (8.1)
fababeans (8.6)
field corn (8.8)
field peas (8.5)
flax (8.8) (incl. low linolenic acid varieties)
kidney beans
lima beans
linola
meadow foxtail[b]
orchard grass[b]
pinto beans
processing peas (8.3)
red clover[a]
sainfoin[ac]
seed corn (8.8)
silage corn (8.8)
snap beans (8.1)
soybeans
spring wheat (including underseeded to forage crops listed)
sweet clover[c]
sweet corn (8.8)
timothy[b]
white beans

[a] Seedling legumes for seed production only.
[b] Seedling grasses for seed production only.
[c] Established stand for seed production.

4. Weeds Controlled:

annual smartweed (7.0)
bird rape*
buttercup
cleavers
cocklebur
common chickweed (7.2)
common groundsel (8.5)*
common ragweed*
corn spurry (7.0)
giant ragweed*
hairy galinsoga
hairy nightshade (6.0)
lady's-thumb
lamb's-quarters (6.2)*
low cudweed
purslane
Russian thistle (7.9)
shepherd's-purse (7.3)
stinkweed (7.8)
stork's-bill
volunteer canola
wild mustard (8.4)
wild radish

* Triazine resistant strains of these weeds are controlled by Basagran.

5. Weeds Suppressed: Field bindweed, redroot pigweed (7.2), Canada thistle – single application (4.7).

* Treat field bindweed before it is dark green and has begun to trail.

6. When Used:

Beans (dry, lima, snap): 1 - 3 trifoliate leaves.
Corn: 1 - 5 leaf.
Fababeans: Soon after 3 leaf stage.
Flax: Soon after crop reaches 5 cm.
Peas (field, processing): Soon after 3 pair of leaves form.
Soybeans: Unifoliate – 2 expanded trifoliate leaves, usually 18 - 28 day after planting.
Spring wheat: Tolerant at any growth stage.

7. How to Apply:

With: Aircraft (Basagran and Assist only) or ground equipment.

Rate:

Basagran:

910 mL/ac: All crops/weeds listed.

710 mL/ac: For control of cocklebur, lady's-thumb, wild mustard, bird rape, stinkweed or shepherd's-purse only. For Canada thistle suppression, repeat applications 7 - 15 days after application if necessary.

400 mL/ac: For spring wheat (not underseeded) only when tank mixed with 2,4-D amine or ester (470 g/L) at 300 - 400 mL/ac. This tank mix will control lady's-thumb, bluebur, burdock (<4 leaf), cocklebur, common plantain, flixweed, lamb's-quarters, mustard (except dog and tansy), prickly lettuce, redroot pigweed, Russian thistle, shepherd's-purse, stinkweed, sweet clover, volunteer canola, wild radish and wild sunflower. Application should be made at the 2 - 4 leaf stage of these weeds.

Assist: Ground: Add 400 mL of Assist per 40 litres of water with a maximum rate of 810 mL/ac. Reduce Assist to 400 mL/ac under hot, humid conditions. Air: Add 50 - 100 mL/ac of Assist. Do not use Assist in excess of 100 mL/ac as substantial crop injury could occur.

Water volume: Air: 20 - 40 L/ac. Ground: 40 - 160 L/ac.

Pressure: Air: 275 kPa minimum. Ground: 275 - 425 kPa.

Nozzles: Flat fan or hollow cone only recommended. Tilt 45° forward to ensure better coverage.

Basagran (cont'd)

8. **Application Tips:** Do not apply to crops that have been stressed (e.g., hail damage, flooding, drought, widely fluctuating temperatures, prolonged cold weather). Best results are when weeds are young and actively growing. Apply Basagran when broadleaf weeds are small and actively growing and before the weeds reach the maximum size recommended for treatment. Apply Basagran to stork's-bill at the 2 - 6 leaf stage and to cleavers at the 1 - 3 whorl stage. Basagran should be applied when the main weed of concern is in the suggested growth stage for treatment.

   Band spraying: Spray minimum of 25 cm wide band. Minimize the amount of dust striking target weeds to ensure adequate coverage and penetration. Do not use cultivation equipment when spraying. Adjust the Basagran rate to proportion of the total area to be sprayed.

9. **How it Works:** Contact herbicide which interferes with photosynthesis. In resistant plants, metabolized to a non-toxic material. Uptake into the plant occurs primarily through the leaves. Thorough coverage of foliage is important for consistent weed control.

10. **Expected Results:**

    Weeds: Weeds turn yellow initially and then brown, usually within 2 weeks.

    Crops: Yellowing, bronzing, speckling or burning occurs sometimes. The crop usually outgrows the condition within 10 days. **Poor results may be expected when** weeds are beyond recommended growth stage, when spray coverage is poor or under poor growing conditions (cool weather conditions or drought).

11. **Effects of Rainfall:** Rainfall within 6 - 8 hours of application may reduce activity.

12. **Movement in Soil:** Bentazon is not adsorbed to soil particles but is rapidly incorporated into the soil organic matter by microorganisms. Does not leach below plow layer.

13. **Grazing and Cropping Restrictions:**

    Drift: Avoid drift onto susceptible crops such as adzuki and mung beans, cucumbers, lentils, mustard, rapeseed, sugar beets and sunflowers.

    Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Succeeding crops: No restrictions.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (1,100). Slightly toxic to fish. Non-toxic to birds and bees.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a heated place, freezing will not affect activity. If frozen, warm to room temperature and shake well.

Betamix *(phenmedipham + desmedipham)*

Betanex *(desmedipham)*

Group 5

Manufacturer **Aventis Crop Science**

1. **Formulations:** Emulsifiable Concentrate: Betamix: 75 g/L phenmedipham + 75 g/L desmedipham; 10 L bottle. Betanex: 150 g/L desmedipham; 10 L bottle.

2. **Registered Mixes:** Herbicide 273.

3. **Crops:** Sugar beet.

4. **Weeds Controlled:**

foxtail (green, yellow)*
kochia
lamb's-quarters
mustard
nightshade
ragweed
redroot pigweed**
stinkweed
wild buckwheat

* Betamix only.
** Betanex is more effective than Betamix.

5. **Weeds Suppressed:** None.

6. **When Used:** Early post-emergence when weeds are early cotyledon to 4 leaves. Do not commence spray application until mid-afternoon.

7. **How to Apply:**

With: Ground equipment as a band or broadcast treatment.

Rate: 1.0 - 4.45 L/ac broadcast equivalent in a maximum of 42 litres of water for each litre of Betamix/Betanex. Use low rate on early cotyledon beets and high rate on beets with at least 4 fully expanded leaves. Repeat application for improved weed control.

8. **Application Tips:** Avoid spraying until mid-afternoon when daytime temperatures will exceed 22°C. High humidity increases efficacy. Best results are obtained with repeat applications of the lowest rate commencing when the first weeds emerge.

9. **How it Works:** Absorbed through leaves. Sharply inhibits rate of assimilation of CO_2 in treated plants within 6 hours. Resistant species (sugar beets) begin recovery in this time while susceptible species do not.

10. **Expected Results:** Under warm conditions, weed kill is complete in 4 - 7 days. Cool conditions require longer periods of up to 2 weeks.

11. **Effects of Rainfall:** Rainfall within 6 hours of application may reduce weed kill.

12. **Movement in Soil:** Very little leaching occurs.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

14. **Toxicity:** Acute oral LD_{50} – phenmedipham. (Rat) 8,000 mg/kg. Acute dermal LD_{50} – phenmedipham. (Rat) 4,000 mg/kg. Acute oral LD_{50} – desmedipham: (Rat) > 10,250 mg/kg. Toxic to fish – avoid contamination of water supply.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Do not store below 0°C.

M121

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Bladex Liquid/ Bladex 90DF *(cyanazine)*

Group 5

Manufacturer: **DuPont Canada Inc.**

DANGER POISON

1. **Formulations:** Liquid; Bladex Liquid; 480 g/L; 2 x 10 L jugs. Water Dispersible Granules; Bladex 90DF, 90%, 1x10 kg bag.
2. **Registered Mixes:** Atrazine, Dual, Eradicane, Sutan$^+$.

   Mixing restrictions: Do **not** mix with any oils or adjuvants, other than Bio-Veg crop oil.
3. **Crops:** Corn [field (8.5) and sweet].
4. **Weeds Controlled:**

   annual smartweeds
   barnyard grass
   black nightshade
   common purslane
   common ragweed
   false ragweed
   green foxtail (6.8)
   kochia
   lady's-thumb
   lamb's-quarters (8.5)
   oak-leaved goosefoot
   prostrate knotweed
   redroot pigweed (7.2)
   Russian thistle
   shepherd's-purse
   stork's-bill
   wild buckwheat (8.3)
   wild mustard (8.4)
   wormseed mustard
   yellow foxtail
5. **Weeds Suppressed:** None.
6. **When Used:**

   Bladex Liquid: May be used pre-plant incorporated on dryland, or pre-emergent followed in 5 - 7 days with irrigation. Do not use post-emergent.

   Bladex Nine-T: May be used pre-plant incorporated, or early post-emergent with Bio-Veg Crop Oil. (Bio-Veg Crop Oil for post-emergent use only.)
7. **How to Apply:**

   With: Ground equipment.

   Rate:

Time	Bladex Liquid (L/ac)	Bladex 90DF (kg/ac)
Pre-plant	1.7 - 2.0	0.9 - 1.1
Pre-emergent (only with irrigation)	1.9 - 2.3	1.0 - 1.2
Early post-emergent	NR*	1.0

   Use lower rates for light textured soils and higher rates for heavier soils.
   * NR – Not Registered.

   Water volume: 60 - 80 L/ac.

   Pressure: 200 - 300 kPa.

   Nozzles: Flat fan recommended.
8. **Application Tips:** Do not use Bladex on soils with more than 70% sand or less than 1% organic matter. For early post-emergent application, add 1 L Bio-Veg crop oil/100 L spray solution. Do not apply beyond the 3 leaf stage of corn (approx. 7.5 cm). A timely inter-row cultivation will control any seedling weeds which escape the treatment. If crop is under stress from cold, wet conditions, injury may occur. Do not apply Bladex if these conditions are expected within a 7-day period after application.
9. **How it Works:** Active through root uptake, requires moisture to carry it to root zone. Interferes with photosynthesis.
10. **Expected Results:** Weeds fail to emerge or die before reaching 2 - 3 leaf stage.

Bladex Liquid/ Bladex 90DF *(cyanazine)*

Group 5

Manufacturer **DuPont Canada Inc.**

DANGER POISON

1. **Formulations:** Liquid; Bladex Liquid; 480 g/L; 2 x 10 L jugs. Water Dispersible Granules; Bladex 90DF, 90%, 1x10 kg bag.
2. **Registered Mixes:** Atrazine, Dual, Eradicane, Sutan$^+$.

   Mixing restrictions: Do **not** mix with any oils or adjuvants, other than Bio-Veg crop oil.
3. **Crops:** Corn [field (8.5) and sweet].
4. **Weeds Controlled:**

   annual smartweeds
   barnyard grass
   black nightshade
   common purslane
   common ragweed
   false ragweed
   green foxtail (6.8)
   kochia
   lady's-thumb
   lamb's-quarters (8.5)
   oak-leaved goosefoot
   prostrate knotweed
   redroot pigweed (7.2)
   Russian thistle
   shepherd's-purse
   stork's-bill
   wild buckwheat (8.3)
   wild mustard (8.4)
   wormseed mustard
   yellow foxtail
5. **Weeds Suppressed:** None.
6. **When Used:**

   Bladex Liquid: May be used pre-plant incorporated on dryland, or pre-emergent followed in 5 - 7 days with irrigation. Do not use post-emergent.

   Bladex Nine-T: May be used pre-plant incorporated, or early post-emergent with Bio-Veg Crop Oil. (Bio-Veg Crop Oil for post-emergent use only.)
7. **How to Apply:**

   With: Ground equipment.

   Rate:

Time	Bladex Liquid (L/ac)	Bladex 90DF (kg/ac)
Pre-plant	1.7 - 2.0	0.9 - 1.1
Pre-emergent (only with irrigation)	1.9 - 2.3	1.0 - 1.2
Early post-emergent	NR*	1.0

   Use lower rates for light textured soils and higher rates for heavier soils.
   * NR – Not Registered.

   Water volume: 60 - 80 L/ac.

   Pressure: 200 - 300 kPa.

   Nozzles: Flat fan recommended.
8. **Application Tips:** Do not use Bladex on soils with more than 70% sand or less than 1% organic matter. For early post-emergent application, add 1 L Bio-Veg crop oil/100 L spray solution. Do not apply beyond the 3 leaf stage of corn (approx. 7.5 cm). A timely inter-row cultivation will control any seedling weeds which escape the treatment. If crop is under stress from cold, wet conditions, injury may occur. Do not apply Bladex if these conditions are expected within a 7-day period after application.
9. **How it Works:** Active through root uptake, requires moisture to carry it to root zone. Interferes with photosynthesis.
10. **Expected Results:** Weeds fail to emerge or die before reaching 2 - 3 leaf stage.

11. **Effects of Rainfall:** Rainfall or irrigation required for activation. Heavy rainfall on very sandy soil may cause leaching and reduce effectiveness.
12. **Movement in Soil:** Degree of movement depends on soil texture, water content and organic matter. In most cases, movement is negligible. On sandy soils, leaching rate was found to be comparable to atrazine.
13. **Grazing and Cropping Restrictions:** Where atrazine mix is used, corn should follow corn.
14. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (182 - 380), Bladex Liquid (149 - 334), Bladex Nine-T (365 – female; 835 – male). Low toxicity to fish and birds.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Not damaged by freezing. Store in a dry place.

Bladex Liquid *(cyanazine)*

For triazine tolerant canola only

Group 5

DANGER POISON

Manufacturer: **DuPont Canada Inc.**

1. **Formulations:** Liquid; 480 g/L; 2 x 10 L jugs.
2. **Registered Mixes:** Fusilade, Lontrel, Poast. Follow label for mixing instructions.

   Mixing restrictions: Add 1/2 the required amount of water, start agitation, add Bladex TTC, add more water, then Fusilade, Lontrel or Poast then Assist oil concentrate, then remaining water.
3. **Crops:** Triazine tolerant canola (varieties: Tribute, Triton, Triumph). **Non-triazine tolerant canola will be killed.**
4. **Weeds Controlled:**

   annual smartweeds
   chickweed
   cleavers
   common groundsel
   hemp-nettle (8.9)
   lady's-thumb
   lamb's-quarters
   redroot pigweed*
   shepherd's-purse
   stinkweed (8.5)
   volunteer flax
   volunteer rapeseed
   (non-triazine tolerant)
   wild buckwheat
   wild mustard

   * Apply when redroot pigweed is small (less than 5.0 cm in height).
5. **Weeds Suppressed:** None.
6. **When Used:** When crop and weeds are in 1 - 4 leaf stage; Cleavers: 1 - 2 whorl stage, volunteer flax 2 - 5 cm in height.
7. **How to Apply:**

   With: Ground equipment.

   Rate: Bladex Liquid: 1.2 L/ac. Bladex Liquid: 1.2 L/ac + Fusilade: 200 - 400 mL/ac. Bladex Liquid: 1.2 L/ac + Lontrel: 0.3 - 0.6 L/ac. Bladex Liquid: 1.2 L/ac + Poast: 325 - 770 mL/ac.

   Water volume: 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended. Screens 50 mesh or larger.
8. **Application Tips:** Optimum weed control is achieved when weeds are small and actively growing; later applications will be less effective.

Bladex Liquid (cont'd)

9. **How it Works:** Inhibits photosynthesis.
10. **Expected Results:** Application of Bladex liquid will result in wilting, leaf yellowing and eventual browning, beginning with the tip and margin of older leaves and proceeding towards the base of the plant.
11. **Effects of Rainfall:** Rainfall within 2 hours of application may reduce effectiveness.
12. **Movement in Soil:** Degree of movement depends on soil texture, water content and organic matter. In most cases, movement is negligible. On sandy soils, leaching rate was found to be comparable to atrazine.
13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.
14. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (182 - 380), Bladex Liquid (149 - 334). Low toxicity to fish and birds.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Not damaged by freezing. Store in a dry place.

Bonanza 10G *(trifluralin)*

(oilseeds, special crops, barley and wheat)

Group 3

Manufacturer **United Agri Products**

1. **Formulations:** Granular; trifluralin 10.0%; 22.7 kg, 500 kg bag.
2. **Registered Mixes:** None.
3. **Crops:** Canola (rapeseed) (including triazine tolerant) (8.9), flax (7.7), lentils (8.5), mustard (8.9), peas (canning, field) (8.9), soybeans*, sunflowers (8.9), fababeans (8.6), barley, dry beans, wheat and alfalfa establishment.

   Underseeding: Alfalfa in flax and canola as cover crops only.
4. **Weeds Controlled:**

   annual bluegrass (8.6)
   barnyard grass (8.3)
   cow cockle (9.0)
   chickweed (7.1)
   downy bromegrass (5.9)
   green foxtail
   knotweed
   lamb's-quarters (8.0)
   Persian darnel
   pigweed (8.2)
   purslane (7.9)
   Russian thistle (7.9)
   wild buckwheat (8.3)
   wild oats (7.5)
   yellow foxtail (8.1)
5. **Weeds Suppressed:** None.
6. **When Used:** Apply before the crop is planted and before weed emergence. It is incorporated thoroughly into the soil to provide herbicidal action that will control all susceptible weeds. Does not control susceptible weeds that have already emerged through the soil at the time of application. It only controls susceptible weeds as they germinate.

   Spring: Not recommended.

   Summer: Rapeseed, (canola), TTC canola, fababeans, flax. Between June 1 and September 1.

   Fall: Rapeseed, (canola), TTC canola, fababeans, flax, lentils, mustard, peas, sunflowers, soybeans, dry beans, alfalfa establishment. Between September 1 and soil freeze-up. Summer or fall on stubble or summerfallow to be seeded the following spring: spring wheat (includes semi-dwarf and durum); between May 1 and freeze-up.

Summer or fall: On stubble or summerfallow to be seeded the following spring: spring wheat (includes semi-dwarf and durum). Between May 1 and freeze-up.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate:

		Sandy soils organic matter		Loams to clay soils organic matter	
Crops	**Timing**	**2 - 6% kg/acre**	**6 - 15% kg/acre**	**2 - 6% kg/acre**	**6 - 15% kg/acre**
Barley	Fall	3.5	4.5	4.5	5.7
Canola (rapeseed)	Fall	4.5	5.7	5.7	5.7 - 6.9
(including TTC)	Summer	6.9	6.9	6.9	6.9
Mustard					
Peas (field, canning)	Fall	4.5	5.7	5.7	5.7 - 6.9
Fababeans					
Sunflowers					
Flax and lentils	Fall	4.5	5.7	4.5	5.7 - 6.9
Flax and fababeans	Summer	6.9	6.9	6.9	6.9

Stubble/summerfallow – wheat rotation

		Organic matter	
Crop	**Timing**	**1 - 3% kg/acre**	**4 - 6% kg/acre**
Spring wheat	May	3.8	4.5
(includes semi-dwarf durum)	June	3.2	3.8
	July	2.6	3.2
		2 - 6% kg/acre	
	Fall	2.2	

Incorporation: First incorporation in the same direction as application, within 24 hours of application. Second at right angles to the first. For maximum effectiveness, delay the second incorporation for 5 days. Both incorporations should be to the depth of 8 - 10 cm.

Implements: Incorporate with disc implements or cultivators only. Deep tillage cultivators are not recommended. A tandem disc is recommended for the first incorporation. Disc implements should be operated at 6 - 10 km/h and cultivators at 10 - 13 km/h.

8. Application Tips:

Land preparation: Before applying, ensure that all emerged and existing weeds have been eliminated through discing, cultivation or by chemical control. Can be applied to stubble or trashy soils; however, heavy trash soils should be thoroughly disced prior to application to allow product penetration into the soil surface. Ensure that all large soil clods are broken before application. If manure has been applied to the field, ensure it is thoroughly mixed into the soil with at least two tillage operations prior to Bonanza 10G application. If the field has been burned to remove crop residue (straw, trash, etc.), ensure that the field is tilled at least once prior to application.

Note: Do not plow (moldboard) land prior to application.

Summer or fall: On stubble or summerfallow to be seeded the following spring: spring wheat (includes semi-dwarf and durum). Between May 1 and freeze-up.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate:

		Sandy soils organic matter		Loams to clay soils organic matter	
		2 - 6% kg/acre	6 - 15% kg/acre	2 - 6% kg/acre	6 - 15% kg/acre
Crops	**Timing**				
Barley	Fall	3.5	4.5	4.5	5.7
Canola (rapeseed)	Fall	4.5	5.7	5.7	5.7 - 6.9
(including TTC)	Summer	6.9	6.9	6.9	6.9
Mustard					
Peas (field, canning)	Fall	4.5	5.7	5.7	5.7 - 6.9
Fababeans					
Sunflowers					
Flax and lentils	Fall	4.5	5.7	4.5	5.7 - 6.9
Flax and fababeans	Summer	6.9	6.9	6.9	6.9

Stubble/summerfallow – wheat rotation

		Organic matter	
		1 - 3% kg/acre	4 - 8% kg/acre
Crop	**Timing**		
Spring wheat	May	3.8	4.5
(includes semi-dwarf durum)	June	3.2	3.8
	July	2.6	3.2
		2 - 8% kg/acre	
	Fall	2.2	

Incorporation: First incorporation in the same direction as application, within 24 hours of application. Second at right angles to the first. For maximum effectiveness, delay the second incorporation for 5 days. Both incorporations should be to the depth of 8 - 10 cm.

Implements: Incorporate with disc implements or cultivators only. Deep tillage cultivators are not recommended. A tandem disc is recommended for the first incorporation. Disc implements should be operated at 6 - 10 km/h and cultivators at 10 - 13 km/h.

8. Application Tips:

Land preparation: Before applying, ensure that all emerged and existing weeds have been eliminated through discing, cultivation or by chemical control. Can be applied to stubble or trashy soils; however, heavy trash soils should be thoroughly disced prior to application to allow product penetration into the soil surface. Ensure that all large soil clods are broken before application. If manure has been applied to the field, ensure it is thoroughly mixed into the soil with at least two tillage operations prior to Bonanza 10G application. If the field has been burned to remove crop residue (straw, trash, etc.), ensure that the field is tilled at least once prior to application.

Note: Do not plow (moldboard) land prior to application.

Bonanza 10G (oilseeds, special crops, barley and wheat) (cont'd)

Method of application: Apply uniformly into the soil surface using a calibrated granular applicator. Using the equipment guidelines provided in the Bonanza 10G label or by the equipment manufacturer adjust the applicator to provide the required amount of Bonanza 10G. These guidelines should only be used as starting points for equipment calibration, and each applicator should be checked frequently to ensure that the correct rate is being applied. Ensure the application is uniform to the entire soil surface and avoid concentration of granules in narrow bands, etc. Ensure all soil clods and lumps are broken during incorporation. Avoid over application.

Note:

* On deep black and heavy textured soils, it is recommended to prework the soil early in the spring to promote weed seed germination followed by another cultivation prior to seeding to destroy existing weed growth.

* Cultivators should only be used for incorporation when soils are in good working condition.

Flax, lentils: To ensure a firm seedbed and to maintain a constant depth of planting, a shallow tillage in the spring is recommended. Seed into a warm (usually after mid May), moist, firm seedbed to a depth of 2 - 4 cm. Both incorporations should be done prior to soil freeze-up in the fall. A tandem disc, discer or field (vibrashank) cultivator is recommended for incorporating to 8 - 10 cm. For best mixing action, operate disc implements at 6 - 10 km/h; cultivators at 10 - 13 km/h. Deep tillage cultivators are not recommended.

9. **How it Works:** Kills weed seedlings as they germinate. Inhibits cell division in the actively growing points of root and shoot.

10. **Expected Results:**

    Weeds: Most weeds die before emerging. Weeds will exhibit swelling in the coleoptile region, stubby, thick primary root development and lack of secondary roots, which leads to death due to inadequate moisture obtaining ability.

11. **Effects of Rainfall:** No effect once trifluralin is incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data available to support such use. Normally, trifluralin carry over will not harm crops grown in rotation. As a precaution, oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not follow a trifluralin treated crop. Drought conditions in the year of treatment may result in higher levels of trifluralin carry over into the next year. To avoid wheat injury, seed less than 7 cm deep into a warm, moist seedbed. Not intended for crops grown for forage or hay. Over-application caused by overlapping or improper calibration or non-uniform application may cause crop injury. Applying to severely eroded knolls may also cause crop injury.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000). In clean water, fish are very sensitive to trifluralin, but in runoff or muddy water, trifluralin binds to soil particles and large amounts can be tolerated by fish. Non-toxic to bees.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Do not store under direct sunlight. Do not store in granular applicator (24 hours maximum).

17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Bonanza, Edge, Fortress, Heritage, Rival and Treflan) will not control trifluralin tolerant green foxtail. To delay selection or reduce the spread of trifluralin tolerant green foxtail, avoid the use of these products repeatedly in the same field, or use a separate herbicide application for the control of trifluralin tolerant green foxtail.

    Note: Similar products are Advance 10G, Bonanza 400, Rival and Treflan.

    Special use: Bonanza 10G on **Barley only** – fall application only, September 1 to soil freeze-up.

    Weeds controlled: Refer to Section 4 (above).

Incorporation: Refer to Section 7 (above).

Rate:

Soil texture, soil organic matter and soil zone			
Light		Medium or heavy	
All soils with 2 - 4% organic matter	All soil textures with 4 - 6% organic matter	Sand and sandy loam with 6 - 10% organic matter	Loam, silt loam, silt, sandy clay loam, silty clay loam, clay loam, silty clay and clay with 6 - 10% organic matter
Brown, Dark Brown, Black and Grey wooded Soil zones	Brown, Dark Brown, Black and Grey wooded Soil zones	Brown, dark Brown, black Soil zones	Black and Deep black Soil zones
3.4 kg/acre	4.5 kg/acre	4.5 kg/acre	5.7 kg/acre

Warning: Do not apply on soils with less than 2% organic matter. Do not apply on land treated with trifluralin products since June 1 of the previous year. Application to severely eroded knolls may result in reduced crop stand.

Bonanza 400 *(trifluralin)*

(cereals)

Group 3

Manufacturer: **United Agri Products**

1. **Formulations:** Emulsifiable Concentrate; 400 g/L; 10 L, 115 L containers.
2. **Registered Mixes:** Avadex BW (barley, wheat), dry bulk fertilizer, Avadex BW + liquid nitrogen fertilizer (28-0-0), liquid nitrogen fertilizer (28-0-0).

   Mixing restrictions: Add Bonanza 400 or Bonanza 400 + Avadex directly into the liquid fertilizer, mix thoroughly and apply as soon as possible. Agitate until application is complete.
3. **Crops:** Barley (8.9), wheat [(durum, spring) (8.6)].

   Underseeding: Not recommended.
4. **Weeds Controlled:** Green foxtail.
5. **Weeds Suppressed:** None.
6. **When Used:** Apply alone or as a tank mix with Avadex BW in the spring after seeding and prior to emergence of wheat or barley.
7. **How to Apply:**

   With: Ground equipment.

   Rate: Light soils: 565 mL/ac. Heavy soils: 850 mL/ac.

   Water volume: 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

Incorporation: Refer to Section 7 (above).

Rate:

Soil texture, soil organic matter and soil zone			
Light		**Medium or heavy**	
All soils with 2 - 4% organic matter	All soil textures with 4 - 6% organic matter	Sand and sandy loam with 6 - 10% organic matter	Loam, silt loam, silt, sandy clay loam, silty clay loam, clay loam, silty clay and clay with 6 - 10% organic matter
Brown, Dark Brown, Black and Grey wooded Soil zones	Brown, Dark Brown, Black and Grey wooded Soil zones	Brown, dark Brown, black Soil zones	Black and Deep black Soil zones
3.4 kg/acre	4.5 kg/acre	4.5 kg/acre	5.7 kg/acre

Warning: Do not apply on soils with less than 2% organic matter. Do not apply on land treated with trifluralin products since June 1 of the previous year. Application to severely eroded knolls may result in reduced crop stand.

Bonanza 400 *(trifluralin)*

(cereals)

Group 3

Manufacturer: **United Agri Products**

1. **Formulations:** Emulsifiable Concentrate: 400 g/L: 10 L, 115 L containers.
2. **Registered Mixes:** Avadex BW (barley, wheat), dry bulk fertilizer, Avadex BW + liquid nitrogen fertilizer (28-0-0), liquid nitrogen fertilizer (28-0-0).

   Mixing restrictions: Add Bonanza 400 or Bonanza 400 + Avadex directly into the liquid fertilizer, mix thoroughly and apply as soon as possible. Agitate until application is complete.
3. **Crops:** Barley (8.9), wheat [(durum, spring) (8.6)].

   Underseeding: Not recommended.
4. **Weeds Controlled:** Green foxtail.
5. **Weeds Suppressed:** None.
6. **When Used:** Apply alone or as a tank mix with Avadex BW in the spring after seeding and prior to emergence of wheat or barley.
7. **How to Apply:**

   With: Ground equipment.

   Rate: Light soils: 565 mL/ac. Heavy soils: 850 mL/ac.

   Water volume: 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

Bonanza 400 (cereals) (cont'd)

Incorporation: Incorporate 2 - 4 cm with 2 cross harrowings with tyne or diamond harrows operated at a speed of at least 8 km/h. Where possible spray and incorporate in the same operation. Incorporate twice within 8 hours.

8. **Application Tips:** Apply only on fields that are trash free or summerfallow. Apply only to soils with less than 15% organic matter that are dry and in good working condition. Do not treat soils that have the potential of becoming water-logged. Crop must be seeded 5 - 8 cm deep in a well tilled seedbed to prevent contact between the chemical and the seed.
9. **How it Works:** Acts on both the root and shoot tips as they emerge. Prevents cell division and affected plants die before emergence. If the shoot portion of the plant escapes to the soil surface, lateral or secondary root growth is inhibited causing a slow death since the plant is unable to gather moisture or nutrients.
10. **Expected Results:**

    Green foxtail: Seeds that germinate below the treated layer will produce plants that will emerge. The secondary root system of plants that form within the treated layer is completely inhibited by trifluralin present in that area. The affected plant dies slowly as crop competition and temperature stress over-tax the rootless plant's ability to take up moisture.

    Crop: Crop safety is maintained when seeded to a depth of 5 - 8 cm. **Poor results may be expected if** conditions causing seedling stress such as wet soils, incorrect planting depth, seedling disease, low temperatures, excessive salt in soil, or drought could bring about damage to the crop.
11. **Effects of Rainfall:** No effect once incorporated into the soil.
12. **Movement in Soil:** None.
13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Succeeding crops: Under normal conditions there will not be a carry over. As a precaution, creeping red fescue, oats, sugar beets, small-seeded grasses such as canary seed or timothy should not be grown in rotation following a trifluralin treated crop.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (10,000). In clean water, fish are very sensitive to trifluralin, but in runoff and muddy water, trifluralin binds to the suspended soil particles and large amounts can be tolerated by fish. Non-toxic to bees. Intake can cause heart, liver and kidney damage. A small amount of vomited liquid inhaled could be fatal.
15. **Precautions, First Aid:** Highly flammable. Could explode if heated. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Do not store below 5°C. If stored below 5°C, bring the contents to 15°C for 24 hours and shake well before using. Do not store near heat, spark or open flame.

    Note: Similar products are Advance 10G, Bonanza 10G, Rival and Treflan.
17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Bonanza, Edge, Fortress, Heritage, Rival and Treflan) will not control trifluralin tolerant green foxtail. To delay selection or reduce the spread of trifluralin tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin tolerant green foxtail.

Bonanza 400 *(trifluralin)*

(oilseeds, special crops)

Group 3

Manufacturer: **United Agri Products**

1. **Formulations:** Emulsifiable Concentrate; 400 g/L; 10 L, 115 L containers.

2. **Registered Mixes:** Liquid nitrogen fertilizer (28-0-0), dry bulk fertilizer.

   Mixing instructions: Pour directly into liquid fertilizer, mix thoroughly and apply as soon as possible with constant agitation.

3. **Crops:**

   Underseeding: Not recommended.

   alsike clover[1]
   alsike red[1]
   asparagus
   Bird's foot trefoil[1]
   black beans
   canning peas
   canola (8.8)(including triazine tolerant)
   cicer milkvetch[1]
   crambe*
   dry field beans
   dry kidney beans
   faba beans (8.6)
   field peas (8.7)
   flax****
   lentils***
   mustard (8.9)
   sainfoin
   safflower
   shelterbelts**
   soybeans
   strawberries
   sunflowers (8.9)
   sweet clover*

   * Spring application only.
   ** Ash (green), caragana, elm (American, Siberian), pine (Scotch).
   *** Fall application only.
   **** Summer or fall use only.
   [1] Seed production only.

4. **Weeds Controlled:**

   annual bluegrass (8.6)
   barnyard grass (8.3)
   bromegrass
   chickweed (7.1)
   cow cockle (9.0)
   downy bromegrass (5.9)
   green foxtail (8.1)
   knotweed
   lamb's-quarters (8.0)
   Persian darnel
   pigweed (8.2)
   purslane (7.9)
   Russian thistle (7.9)
   wild buckwheat (8.3)
   wild oats (7.5)
   yellow foxtail (8.1)

5. **Weeds Suppressed:** None.

6. **When Used:**

   Fall: September 1 to freeze-up. **Fall incorporation is discouraged where soil drifting is a problem.**

   Spring: Cultivate to destroy existing weeds. Apply immediately prior to, or up to 3 weeks before planting.

   Summer: On summerfallow, between June 1 to September 1.

   Shelterbelts (transplanted): Apply prior to transplanting seedlings.

7. **How to Apply:**

   With: Ground equipment.

   Rate:

   Fall:
   1.1 L/ac on Light (sandy, sandy loam) soils; less than 6% organic matter.
   1.4 L/ac on Heavy (loamy to clay type) soils; 6 - 15% organic matter, and low to medium wild oat infestations.

   Spring:
   810 mL/ac on Light (sandy, sandy loam) soils; less than 6% organic matter.
   1.1 L/ac on Heavy (loamy to clay type) soils; 6 - 15% organic matter; low to medium wild oat infestations.

   Summer:
   1.7 L/ac on all soils.

   Shelterbelts (transplanted):
   2.2 L/ac on Light (sandy, sandy loam) soils; less less than 6% organic matter.
   4.4 L/ac on Heavy (loamy to clay type) soils; 6 - 15% organic matter.

Bonanza 400 (oilseeds, special crops) (cont'd)

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: First at a right angle, within 8 hours of application. Fall application should be followed with 2 incorporations at right angles, before freeze-up. A tandem disc, discer or field (vibrashank) cultivator is recommended for incorporating to 7.5 - 10 cm. For best results, operate disc implement at 6.5 - 10 km/h; cultivator at 10 - 13 km/h.

8. **Application Tips:** Do not apply on soils that are wet, in poor tilth or contain 15% or more organic matter. To avoid concentrating wild oat seeds below the treated layer, do not plow land prior to Trifluralin application. Use on soils with less than 20 - 25% straw cover. On stubble, chop and thoroughly mix residues and weed growth into the soil before application. A tandem disc mixes best on stubble or poor condition soils (crusted, lumpy or wet). Fall or summer applications should be followed by a light spring tillage to a 5 - 8 cm depth before seeding. Do not apply with air seeder as it gives non-uniform seeding depth and patchy germination.

9. **How it Works:** Kills seedlings as they germinate. Inhibits cell division in actively growing points of root and shoot.

10. **Expected Results:**

    Weeds: Most die before emerging. Weeds will exhibit swelling in coleoptile region, stubby, thick primary root development and lack of secondary roots, which leads to death due to inadequate moisture-obtaining ability.

11. **Effects of Rainfall:** No effect once incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay, there are not sufficient data available to support such use.

    Succeeding crops: Normally, carry over will not harm crops grown in rotation. As a precaution, creeping red fescue, oats, sugar beets and small-seeded grasses such as canary seed or timothy should not be grown in rotation following a trifluralin treated crop. Drought conditions in year of treatment may result in higher levels of carry over into the next year. To avoid wheat injury, seed less than 7 cm deep into a warm, moist seedbed.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (10,000). In clean water, fish are very sensitive, but in runoff or muddy water, it binds to soil particles and large amounts can be tolerated by fish. Non-toxic to bees. Intake can cause heart, liver and kidney damage. A small amount of vomited liquid inhaled could be fatal.

15. **Precautions, First Aid:** Highly flammable. Could explode if heated. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Do not store below 5°C. If stored below 5°C, bring the contents to 15°C for 24 hours and shake well before using. Do not store near heat, spark or open flame.

    Note: Similar products are Advance 10G, Bonanza 10G, Rival and Treflan.

17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Bonanza, Fortress, Edge, Heritage, Rival and Treflan) will not control trifluralin tolerant green foxtail. To delay selection or reduce the spread of trifluralin tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin tolerant green foxtail.

Breaker *(metribuzin + MCPA amine salt)*

Group 4,5

Manufacturer: **Interprovincial Cooperative Limited**

WARNING POISON

1. **Formulations:** Metribuzin 75 DF; Dispersible granule 750 g/kg; 1 - 2.5 kg container. MCPA Amine; Solution; 500 g/L, 1 x 10 L container.
2. **Registered Mixes:** None.
3. **Crops:** Spring wheat and barley. **Do not** use on soils with less than 3% organic matter.
4. **Weeds Controlled:**
   - burdock
   - chickweed (including sulfonyl urea tolerant populations)
   - cocklebur
   - green smartweed
   - kochia
   - lady's-thumb
   - lamb's-quarters
   - mustards (except dog mustard)
   - ragweed
   - redroot pigweed
   - Russian pigweed
   - seedling flixweed
   - shepherd's-purse
   - stinkweed
   - volunteer non-triazine tolerant canola
5. **Weeds Suppressed:** Hemp-nettle.
6. **When Used:**

   Crop: Do not use if soil has less than 3% organic matter. Apply post emergent when the crop is in 3 - 5 leaf stage.

   Weeds: Apply post emergent to the weeds, when the weeds are small, less than 2" (5 cm) high.
7. **How to Apply:**

   Rate: 100 g/ac Metribuzin 75 DF and 400 mL/ac of MCPA Amine 500.

   Water volume: Minimum of 40 L/acre.

   Pressure: 200 - 275 kPa.

   Nozzles: Flat fan nozzles with an opening no smaller than 8002 or TK2 with 50 mesh screen. Angle nozzles 45° forward.

   Sprayer clean-up: Spray equipment must be cleaned thoroughly to remove traces of herbicide that might injure other crops to be sprayed.
   1) Drain any remaining solution from the spray tank.
   2) Rinse the spray tank.
   3) Refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for 5 minutes and spray out.
   4) Repeat this procedure twice.
   5) Fill the spray tank with clean water, recycle for 5 minutes, and spray out.
   6) Clean pump and nozzle screens thoroughly.
   7) Wash away any spray mixture from the outside of the spray tank, nozzles or spray rig.
8. **Application Tips:** Allow 4 - 5 days between applications of Breaker and the application of a post-emergent wild oat herbicide. Allow 4 - 5 days after frost for crop to recover before applying Breaker. Weed control and crop tolerance may be reduced if Breaker is applied later than specified.
9. **How it Works:** Metribuzin 75 DF is a systemic herbicide that kills weeds by stopping photosynthesis. MCPA Amine 500 is a systemic herbicide that disrupts cell division. MCPA Amine 500 is absorbed through leaves and roots and is translocated to actively growing areas in the plant.
10. **Expected Results:**

    Broadleaf weeds: For weeds susceptible to Metribuzin 75DF, initial yellowing will occur within 7 - 10 days; weeds turn brown and die within 14 - 16 days. For weeds susceptible to MCPA Amine, twisting begins between 2 - 20 days after application, followed by the plant turning brown and dying.

Breaker (cont'd)

Crop: Crop height reduction or yellowing may occur if high temperatures or frost occur within 48 hours of application. If frost occurs, allow 4 - 5 days for crop to recover prior to application. Allow 4 -5 day interval between Breaker application and annual grass herbicide treatments. Certain barley varieties such as Klondike, Leduc, Johnston and other new varieties may be sensitive to Breaker, but any temporary injury is usually more than offset by improved weed control. See label for details.

11. **Effects of Rainfall:** Rainfall within 6 hours after application may reduce weed control of Breaker.
12. **Movement in Soil:** Breaker is not readily leached on recommended soil types over 3% organic matter. Longer residual in dry soil.
13. **Grazing and Cropping Restrictions:**

    Grazing: Do not graze grain within 30 days of application.

    Pre-harvest: Do not harvest grain within 60 days of application.

    Re-cropping: No re-cropping restrictions in the year following application for field crops.
14. **Toxicity:**

    Metribuzin 75DF: Low acute mammalian toxicity. Acute LD_{50} (rats) (mg/kg) = 1,100 -2,300. Slightly toxic to fish and birds.

    MCPA Amine 500: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700 - 800). Low toxicity to fish. Can be absorbed through the skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:**

    Metribuzin 75DF: No damage by freezing, but avoid large temperature fluctuations. Store in a cool, dry place.

    MCPA Amine: Do not allow to freeze.

Buctril M *(bromoxynil + MCPA)*

Group 4,6

Manufacturer: **Aventis Crop Science**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; 280 g/L bromoxynil + 280 g/L MCPA; 8 L jugs, 113 L returnable drum.
2. **Registered Mixes:** Accord (spring wheat and durum wheat), Accord + Avenge (spring wheat), Ally + Surfactant (3 g/ac, barley, wheat), Achieve DG, Achieve 40DG, Atrazine (corn), Avenge (barley, Avenge wheat varieties), MCPA (amine, ester, K salt) (barley, oats, wheat), Poast + Merge (flax), Select plus Amigo (flax, including low linolenic varieties), TCA (barley, oats), Horizon (spring wheat, durum wheat), Puma (spring wheat, durum wheat); Puma Super (spring wheat and durum wheat), Refine Extra (2.7 g/ac).

   Mixing restrictions: Ally: add 1/2 amount of water to tank, add Ally, agitate, add rest of water, add Buctril M and then surfactant. Atrazine: add Atrazine (450 - 910 g active/ac) to tank first. Do not add oil or surfactant. Observe precautions and limitations of both labels. TCA: Prepare Buctril M mix, then add TCA. Avenge: add 1/2 of the water, add Buctril M, add rest of water, add Avenge. MCPA: add 1/2 of the water, add MCPA, agitate, add rest of water, add Buctril M. Achieve DG: Refer to Achieve DG write-up for mixing instructions. Select: Prepare Buctril M mix, then add Select plus Amigo. Horizon: add Buctril M, then add Horizon, then add Score. Puma: add Buctril M, then add Puma.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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3. **Crops:**

barley (8.8)
canary seed (8.5)
durum wheat (8.6)
fall rye
field corn (9.0)
flax (8.4)
oats (8.8)
solin (low linolenic flax)
spring wheat (8.6)
sweet corn (9.0)
winter wheat (8.8) (fall or spring applied)

Seedling grasses (for seed)

bromegrass (8.9)
creeping red fescue (8.7)
crested wheatgrass (8.5)
intermediate wheatgrass (8.5)
meadow fescue (8.3)
meadow foxtail
orchard grass (8.9)
reed canary grass
Russian wild ryegrass (9.0)
slender wheatgrass (8.5)
tall fescue
tall wheatgrass (8.5)
timothy (8.5)

Established grasses

timothy (for seed or hay)

Underseeding: Legumes not recommended.

4. **Weeds Controlled:**

American nightshade
ball mustard
bluebur
cocklebur
common buckwheat
common groundsel
common ragweed
cow cockle (7.8)
flixweed (5.7)
green smartweed
kochia (6.7)
lady's-thumb
lamb's-quarters (8.6)
night-flowering catchfly (7.8)
pale smartweed (8.2)
redroot pigweed (7.9) (except flax)
Russian thistle (7.1)
scentless chamomile (7.2)(seedlings only)
shepherd's-purse (6.0)
stinkweed (8.9)
tartary buckwheat (8.5)
volunteer rapeseed (8.7)
volunteer sunflower
wild buckwheat (8.1)
wild mustard (8.4)
wild tomato
wormseed mustard

5. **Weeds Suppressed:** Canada thistle (4.9) and perennial sow-thistle.

6. **When Used:**

Cereals: 2 leaf to early flag leaf.
Winter wheat, fall rye: 2 - 4 leaf (fall); after growth begins to early flag leaf (spring).
Canary seed: 3 - 5 leaf.
Flax: 5 - 10 cm.
Corn: 4 - 6 leaf.
Seedling grasses: 2 - 4 leaf (establishment year only, not underseeded to legumes).
Established timothy (for hay): 3 - 6 leaf stage.
Weeds: before 5 leaf stage. Buckwheats, groundsel, lamb's-quarters, mustards (wild, wormseed), ragweed, stinkweed – up to 8 leaf stage.

7. **How to Apply:**

With: Aircraft (wheat, barley and oats only) or ground equipment.

Rate: 400 mL/ac.

Water volume: Air: 8 L/ac or more. Ground: 20 L/ac or more. Corn: 80 - 120 L/ac. Seedling grasses: 60 L/ac; Established timothy: 60 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended. Hollow cone (air only).

8. **Application Tips:** Avoid spraying during a severe drought. Under conditions of high temperature and humidity, slight discoloration of cereals may occur but no effect on crop yields. Flax is less tolerant than cereals; therefore, do not spray flax in hot humid weather when daytime temperatures are over 25 - 29°C. Best results are achieved when weeds are sprayed in seedling stage, with good spray coverage.
Corn: Buctril M at 400 mL/ac as an overall spray only up to 6 leaf stage. Buctril M + Atrazine for a broader spectrum of weed control. Cultivation after application is not recommended.

3. Crops:

barley (8.8)
canary seed (8.5)
durum wheat (8.6)
fall rye
field corn (9.0)
flax (8.4)
oats (8.8)
solin (low linolenic flax)
spring wheat (8.6)
sweet corn (9.0)
winter wheat (8.8) (fall or spring applied)

Seedling grasses (for seed)

bromegrass (8.9)
creeping red fescue (8.7)
crested wheatgrass (8.5)
intermediate wheatgrass (8.5)
meadow fescue (8.3)
meadow foxtail
orchard grass (8.9)
reed canary grass
Russian wild ryegrass (9.0)
slender wheatgrass (8.5)
tall fescue
tall wheatgrass (8.5)
timothy (8.5)

Established grasses

timothy (for seed or hay)

Underseeding: Legumes not recommended.

4. Weeds Controlled:

American nightshade
ball mustard
bluebur
cocklebur
common buckwheat
common groundsel
common ragweed
cow cockle (7.8)
flixweed (5.7)
green smartweed
kochia (6.7)
lady's-thumb
lamb's-quarters (8.6)
night-flowering catchfly (7.8)
pale smartweed (8.2)
redroot pigweed (7.9) (except flax)
Russian thistle (7.1)
scentless chamomile (7.2)(seedlings only)
shepherd's-purse (6.0)
stinkweed (8.9)
tartary buckwheat (8.5)
volunteer rapeseed (8.7)
volunteer sunflower
wild buckwheat (8.1)
wild mustard (8.4)
wild tomato
wormseed mustard

5. Weeds Suppressed: Canada thistle (4.9) and perennial sow-thistle.

6. When Used:

Cereals: 2 leaf to early flag leaf.
Winter wheat, fall rye: 2 - 4 leaf (fall); after growth begins to early flag leaf (spring).
Canary seed: 3 - 5 leaf.
Flax: 5 - 10 cm.
Corn: 4 - 6 leaf.
Seedling grasses: 2 - 4 leaf (establishment year only, not underseeded to legumes).
Established timothy (for hay): 3 - 6 leaf stage.
Weeds: before 5 leaf stage. Buckwheats, groundsel, lamb's-quarters, mustards (wild, wormseed), ragweed, stinkweed – up to 8 leaf stage.

7. How to Apply:

With: Aircraft (wheat, barley and oats only) or ground equipment.

Rate: 400 mL/ac.

Water volume: Air: 8 L/ac or more. Ground: 20 L/ac or more. Corn: 80 - 120 L/ac. Seedling grasses: 60 L/ac; Established timothy: 60 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended. Hollow cone (air only).

8. Application Tips:

Avoid spraying during a severe drought. Under conditions of high temperature and humidity, slight discoloration of cereals may occur but no effect on crop yields. Flax is less tolerant than cereals; therefore, do not spray flax in hot humid weather when daytime temperatures are over 25 – 29°C. Best results are achieved when weeds are sprayed in seedling stage, with good spray coverage.
Corn: Buctril M at 400 mL/ac as an overall spray only up to 6 leaf stage. Buctril M + Atrazine for a broader spectrum of weed control. Cultivation after application is not recommended.

Buctril M (cont'd)

9. **How it Works:** Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. MCPA is absorbed through leaves and is readily translocated in the plant.
10. **Expected Results:** Small burnt spots on the leaf can appear within hours, death takes up to 2 weeks. **Poor results may be expected if** poor coverage. Poor penetration through crop canopy.
11. **Effects of Rainfall:** No effect.
12. **Movement in Soil:** Readily leached from soil. Longer residual in dry soil.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest for greenfeed until 30 days after treatment.
    Succeeding crops: No restrictions.
14. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (365). Very toxic to fish and birds. Non-toxic to bees. May cause burns and may be absorbed through the skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Does not store the water soluble bags below freezing.

Calmix Pellets/Hybor-D/ Premium Weed & Pave Solution

(bromacil + 2,4-D)

Group 4,5

Manufacturer: **Nufarm/United Agri Products**

1. **Formulations:** Calmix Pellets: 3.0% bromacil + 5% 2,4-D; 1 kg, 5 kg bags. Hybor-D granular: 2.0% bromacil + 5% 2,4-D; 5 kg Shaker boxes. Premium Weed and Pave Solution: 1.5% bromacil + 0.75% 2,4-D, 20 L.
2. **Registered Mixes:** None.
3. **Crops:** Non-crop areas only.
4. **Weeds Controlled:** Non-selective.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** May be applied during the growing season, but to prevent growth, apply in fall or early spring.
7. **How to Apply:**
    With: Calmix spreader or shaker, or Hybor-D shaker box.
    Rate: Apply higher rate to heavier soils and/or to extend the growth control period.

Weeds	Calmix pellets kg/100 m^2	Hybor-D kg/100 m^2	Premium Weed and Pave Solution l/100 m^2
Annual weeds and perennial seedlings	2.5	5.0	5.0
Shallow-rooted perennials	3.75	—	7.5
Heavy perennial growth	5.0	7.5	10.0

Spot treatment Calmix: 37.5 g to about 1 m^2. Repeat treatment when required.

Buctril M (cont'd)

9. **How it Works:** Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. MCPA is absorbed through leaves and is readily translocated in the plant.
10. **Expected Results:** Small burnt spots on the leaf can appear within hours, death takes up to 2 weeks. **Poor results may be expected if** poor coverage. Poor penetration through crop canopy.
11. **Effects of Rainfall:** No effect.
12. **Movement in Soil:** Readily leached from soil. Longer residual in dry soil.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest for greenfeed until 30 days after treatment.

    Succeeding crops: No restrictions.
14. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (365). Very toxic to fish and birds. Non-toxic to bees. May cause burns and may be absorbed through the skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Does not store the water soluble bags below freezing.

Calmix Pellets/Hybor-D/Premium Weed & Pave Solution

(bromacil + 2,4-D)

Group 4,5

Manufacturer: **Nufarm/United Agri Products**

1. **Formulations:** Calmix Pellets; 3.0% bromacil + 5% 2,4-D; 1 kg, 5 kg bags. Hybor-D granular; 2.0% bromacil + 5% 2,4-D; 5 kg Shaker boxes. Premium Weed and Pave Solution: 1.5% bromacil + 0.75% 2,4-D, 20 L.
2. **Registered Mixes:** None.
3. **Crops:** Non-crop areas only.
4. **Weeds Controlled:** Non-selective.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** May be applied during the growing season, but to prevent growth, apply in fall or early spring.
7. **How to Apply:**

    With: Calmix spreader or shaker, or Hybor-D shaker box.

    Rate: Apply higher rate to heavier soils and/or to extend the growth control period.

Weeds	Calmix pellets kg/100 m^2	Hybor-D kg/100 m^2	Premium Weed and Pave Solution L/100 m^2
Annual weeds and perennial seedlings	2.5	5.0	5.0
Shallow-rooted perennials	3.75	—	7.5
Heavy perennial growth	5.0	7.5	10.0

Spot treatment Calmix: 37.5 g to about 1 m^2. Repeat treatment when required.

Around utility poles, treat 1.25 m around each pole, 250 g Calmix/pole.
Spot treatment Hybor: 63 g to about 1 m^2.
Premium weed: 5 - 10 L/100m^2 for total vegetation control.

8. **Application Tips:** Do not use near lawns or flower beds. **Do not apply closer than 1.5 times the height of nearby trees.** Roots from large trees may extend well beyond the height of the tree and may extend beneath areas to be treated. Be cautious where trees are in close proximity to the treatment site. Do not apply on slopes where water erosion may carry chemical onto areas of desirable vegetation. Do not contaminate water used for irrigation or other domestic uses.
9. **How it Works:** Systemic action, enters plant via roots.
10. **Expected Results:** Vegetation turns brown and dies. No new growth will appear, resulting in bare ground. Rapidity and duration of control will depend upon amount of chemical applied, soil type and environmental conditions. **Poor results may be expected if** inadequate application rates, soil erosion removes chemical from treated area when applied on slopes or insufficient rainfall to activate chemical.
11. **Effects of Rainfall:** Moisture will activate and carry the herbicide into the root zone.
12. **Movement in Soil:** Once fixed in the soil, there is very little lateral movement. Pellets and granular can be carried by erosion.
13. **Grazing and Cropping Restrictions:** Use on non-crop areas only.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = bromacil (5,200); 2,4-D (375). Slightly toxic to fish. Non-toxic to birds. May cause burns and may be absorbed through the skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in dry area.

Casoron *(dichlobenil)*

Group 20

Manufacturer **United Agri Products**

1. **Formulations:** Granular; 4%; 2 kg, 3 kg shaker jug, 15 kg bag.
2. **Registered Mixes:** None.
3. **Crops:**

arbor vitae
ash
caragana shelterbelts
crabapple
cutleaf weeping birch
established fruit trees*
honeysuckle
juniper
lilac
linden
maple
non-crop areas
raspberries
roses
saskatoons
white cedar
willow

* Apple, cherry, peach, pear, plum at least 1 year old.

4. **Weeds Controlled:**

annual bluegrass
artemisia*
bindweed*
Canada thistle*
chickweed
dandelion*
foxtail
groundsel
horsetail
knotweed
kochia
lamb's-quarters
mustard
pigweed
plantain
purple loosestrife
purslane
quackgrass*
shepherd's-purse
smartweeds
sow-thistle
spurge
vetch*
wild buckwheat*

* Controlled with higher rates with late fall application.

Casoron (cont'd)

5. **Weeds Suppressed:** None.
6. **When Used:** For best results apply when soil temperatures are cool.

   Annual weeds: Apply to prepared weed-free soil either in early spring before seeds of annuals germinate or after cultivation has removed weeds. Do not apply until 4 weeks after transplanting tolerant crops.

   Perennial weeds: Apply in fall (October 15 until soil freeze-up) on crops established for at least 1 year. Quackgrass and artemisia in established woody ornamentals, apply in fall and again in the early spring before May 1.

   Raspberries: Apply in late fall but before soil freeze-up. Do not cultivate or work into the soil. Do not apply in spring as injury may occur.
7. **How to Apply:**

   With: Ground granular applicator.

   Rate:
   Annual weeds: 45 - 70 kg/ac, based on area actually treated.
   Quackgrass, artemisia in woody ornamentals: 60 kg/ac in fall; 60 kg/ac again in spring.
   Quackgrass, thistles, bindweed in woody ornamentals: 91 - 111 kg/ac.
   Raspberries: 71 kg/ac.
8. **Application Tips:** Do not use on light sandy soils with less than 2% organic matter. Do not use on firs, hemlock, spruce, Mugho pine or on herbaceous perennials. Do not use in seed beds, transplant, or cutting beds or in greenhouses. Do not apply until 6 months after rooting of cuttings in the field.
9. **How it Works:** Snow melt or rain moves Casoron into the soil. Casoron inhibits germination but acts primarily on growing points and root tips.
10. **Expected Results:** Growth of emerging shoots of some perennials controlled. Tolerant crops are unaffected if roots do not come in contact with Casoron in the upper layers of the soil.
11. **Effects of Rainfall:** If it is dry, poor results can be expected.
12. **Movement in Soil:** Some movement in coarse-textured soils.
13. **Grazing and Cropping Restrictions:** Do not transplant into treated soil for 1 year. Do not plant vegetables or other sensitive crops the year following treatment. Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.
14. **Toxicity:** Very low mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (3,160). Slightly toxic to fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Dry storage – not affected by frost.

Champion Extra *(fenoxaprop-p-ethyl + thifensulfuron methyl + tribenuron methyl)*

Group 1,2

Manufacturer **DuPont Canada Inc.**

1. **Formulations:**
   1. Extra: Dry flowable; 50% thifensulfuron methyl, 25% tribenuron methyl; 2 x 162 gram containers.
   2. Champion: Emulsifiable Concentrate; 92 g/L. fenoxaprop-p-ethyl.; 2 x 8.1 L jugs.
2. **Registered Mixes:** MCPA Ester 500 (340 mL/ac).

3. Crops: Barley (all spring varieties).

4. Weeds Controlled:

Champion Extra

barnyard grass
chickweed (8.5)
corn spurry (8.8)
cow cockle (8.7)
green foxtail
green smartweed
hemp-nettle (8.4)
kochia (8.5)
lady's-thumb
lamb's-quarters (8.6)
redroot pigweed (8.4)
Russian thistle (7.9)
shepherd's-purse (8.2)
stinkweed (8.6)
tartary buckwheat (8.3)
volunteer rapeseed (8.6) (excluding Smart-trait)
wild buckwheat (7.7)
wild mustard (8.6)
wild oats

Champion Extra + MCPA

Refer to MCPA Ester label for additional weeds controlled.

5. Weeds Suppressed: Canada thistle (7.1), sow-thistle, round-leaved mallow (6.4), cleavers (6.7), scentless chamomile (6.9), stork's-bill (6.7), toadflax [less than 15 cm tall (7.1)].

6. When Used:

Crop: Treatment at the 3 - 4 leaf stage of crops gives maximum crop tolerance. However, Champion Extra may be applied to barley at the 2 - 5 leaf stage on the main stem with no more than 2 tillers. The 2 tiller stage of barley usually occurs within 25 days after seeding.

Weeds: Wild oats, foxtail (green), barnyard grass: Apply when the weeds have 1 - 6 leaves prior to the emergence of the 3rd tiller.

Broadleaf weeds: Apply to young, actively growing broadleaf weeds before the canopy closes. Weeds emerging after treatment may not be controlled.

Wild buckwheat: Apply to actively growing wild buckwheat in the 1 - 3 leaf stage.

Cleavers: Apply at 1 - 3 whorl stage.

Canada thistle, sow-thistle: Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are no larger than 15 cm tall before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistles will not be controlled.

Chickweed: Apply when the chickweed is small (1 - 6 leaf) and actively growing, but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled.

Round-leaved mallow: Apply to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height). Champion Extra will keep mallow stunted but may not reduce the overall populations.

Toadflax: Apply when toadflax is no taller than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application.

Volunteer rapeseed: Champion Extra alone will not control canola varieties with the Smart-trait.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate: Champion: 405 mL/ac, Extra: 8 g/ac.

Water volume: 40 L/ac.

Pressure: Ground 275 kPa.

Nozzles: The use of 80 or 110 flat fan nozzles is recommended for optimum spray coverage.

3. Crops: Barley (all spring varieties).

4. Weeds Controlled:

Champion Extra

barnyard grass
chickweed (8.5)
corn spurry (8.8)
cow cockle (8.7)
green foxtail
green smartweed
hemp-nettle (8.4)
kochia (8.5)
lady's-thumb
lamb's-quarters (8.6)
redroot pigweed (8.4)
Russian thistle (7.9)
shepherd's-purse (8.2)
stinkweed (8.6)
tartary buckwheat (8.3)
volunteer rapeseed (8.6)
(excluding Smart-trait)
wild buckwheat (7.7)
wild mustard (8.6)
wild oats

Champion Extra + MCPA

Refer to MCPA Ester label for additional weeds controlled.

5. Weeds Suppressed: Canada thistle (7.1), sow-thistle, round-leaved mallow (6.4), cleavers (6.7), scentless chamomile (6.9), stork's-bill (6.7), toadflax [less than 15 cm tall (7.1)].

6. When Used:

Crop: Treatment at the 3 - 4 leaf stage of crops gives maximum crop tolerance. However, Champion Extra may be applied to barley at the 2 - 5 leaf stage on the main stem with no more than 2 tillers. The 2 tiller stage of barley usually occurs within 25 days after seeding.

Weeds: Wild oats, foxtail (green), barnyard grass: Apply when the weeds have 1 - 6 leaves prior to the emergence of the 3rd tiller.

Broadleaf weeds: Apply to young, actively growing broadleaf weeds before the canopy closes. Weeds emerging after treatment may not be controlled.

Wild buckwheat: Apply to actively growing wild buckwheat in the 1 - 3 leaf stage.

Cleavers: Apply at 1 - 3 whorl stage.

Canada thistle, sow-thistle: Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are no larger than 15 cm tall before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistles will not be controlled.

Chickweed: Apply when the chickweed is small (1 - 6 leaf) and actively growing, but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled.

Round-leaved mallow: Apply to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height). Champion Extra will keep mallow stunted but may not reduce the overall populations.

Toadflax: Apply when toadflax is no taller than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application.

Volunteer rapeseed: Champion Extra alone will not control canola varieties with the Smart-trait.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate: Champion: 405 mL/ac, Extra: 8 g/ac.

Water volume: 40 L/ac.

Pressure: Ground 275 kPa.

Nozzles: The use of 80 or 110 flat fan nozzles is recommended for optimum spray coverage.

Champion Extra (cont'd)

Mixing instructions:

1. Ensure that the spray tank, lines and filter are thoroughly clean.
2. Fill the spray tank half full with clean water and start agitation or bypass system.
3. Add the required amount of Extra (container #1) while maintaining agitation until Extra is completely in suspension. Use all containers of Extra, if using more than one container.
4. Add the correct amount of Champion (container #2) and continue agitation. Use all containers of Champion, if using more than one container.
5. Triple rinse the emptied containers into the spray tank.
6. Add the remaining amount of water while agitation continues.
7. On repeat loads, ensure that the amount of spray solution left in the spray tank from the previous load is less than 10% of the volume to be mixed.
8. Spray out immediately. Spray mixture should not be left in the tank overnight. If spray solution is left standing without agitation, thoroughly agitate and re-suspend any settled Champion Extra Tank Mix before resuming the spraying operation.
9. **Do not** tank mix with any other chemical additives, pesticides, surfactants or fertilizers.

Sprayer clean-up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Champion Extra when cleaning.

1. Drain and flush tank, boom and hoses with clean water for a minimum of 10 minutes. Visually inspect tank to ensure removal of all visible residues of Champion Extra. If necessary, repeat step 1.
2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum of 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes with agitation. Again, flush the hoses booms and nozzles with the cleaning solution and drain the tank.
3. Remove nozzles and screens, and clean separately in bucket containing cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. Application Tips: Reduced control may result during periods of stress when plants are not actively growing, or when daytime temperatures – before or following application – are very hot combined with very dry conditions and low humidity, or when plants are under stress. **Do not** apply to crop that is stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result. A time interval of 7 days prior to application or 4 days after application of Champion Extra tank mix is required before any other pesticide can be applied.

9. How it Works:

Fenoxaprop-p-ethyl: Contact as well as systemic, no soil activity. Regions of high meristematic activity such as root and shoot tips are known to be affected.

Thifensulfuron and Tribenuron: Absorbed by foliage. Inhibits cell elongation.

10. Expected Results:

Grassy weeds: Reduction of leaf growth and chlorotic blotching within 1 - 3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and complete death within 14 - 21 days after application.

Broadleaf weeds: Growth stops almost immediately. Discoloration of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed susceptibility. **Poor results may be expected if** there is improper mixing, timing or coverage, or when weeds are under drought stress.

11. Effects of Rainfall: Rainfall within 4 hours of application may lessen degree of weed control.

12. Movement in Soil: Fenoxaprop-p-ethyl appears to undergo rapid hydrolysis in the soil. Thifensulfuron and Tribenuron move very little in the soil and have a very short life in the soil.

13. Grazing and Cropping Restrictions: Do not graze the treated crops or cut for hay; sufficient data is not available to support such use. Pre-harvest interval: 50 days. Do not exceed a total of 8 grams/acre of Extra per crop year.

14. Toxicity:

Fenoxaprop-p-ethyl: Acute oral LD_{50} (rat) > 2940 mg/kg.

Thifensulfuron and Tribenuron: Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) is greater than 5000.

15. Precautions, First Aid: Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. Storage: Store product in closed, original container in a cool, dry, well-ventilated room.

17. Resistance Management: Some naturally occurring biotypes of certain weeds listed on this label may not be controlled. To delay selection of resistant populations, rotate the use of Group 1 and Group 2 products with other products effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Champion Plus *(fenoxaprop-p-ethyl + MCPA + 2,4-D + thifensulfuron)*

Group 1,2,4

Manufacturer: **DuPont Canada Inc.**

WARNING POISON

1. Formulations:

1. Champion FM: Emulsifiable Concentrate; 45 g/L. fenoxaprop-p-ethyl + 210 g/L. MCPA ester + 70 g/L. 2,4-D Ester, 2 x 8.1 L containers.
2. Plus; Dry flowable; thifensulfuron; 75%, 2 x 81 g containers.

2. Registered Mixes: Lontrel.

3. Crops: Barley (all spring varieties).

4. Weeds Controlled:

annual sunflower
ball mustard
burdock
chickweed
cocklebur
corn spurry
cow cockle
field horsetail
flixweed
green foxtail
green smartweed
hemp-nettle
hoary cress
kochia
lady's-thumb
lamb's-quarters
mustards (except dog and green tansy)
plantain
prickly lettuce
ragweeds
redroot pigweed
Russian pigweed
Russian thistle
shepherd's-purse
stinkweed
vetch
volunteer rapeseed (including smart-trait)
wild buckwheat
wild mustard
wild oats
wild radish
yellow foxtail

5. Weeds Suppressed: Canada thistle.

6. When Used:

Crop: Treatment at the 3 - 4 leaf stage of crops gives maximum crop tolerance. However, Champion Plus may be applied to barley that has a minimum of 2 leaves and up to a maximum of 5 leaves on the main stem. Plants must not have more than 2 tillers. Application of Champion Plus past the emergence of the second tiller will result in crop damage. The two tiller stage of barley usually occurs within 25 days of seeding.

Annual grassy weeds: Wild oats and foxtail (green and yellow) – apply when the weeds have 1 leaf up to a maximum of 5 leaves on the main stem plus 2 tillers.

Champion Plus (cont'd)

Broadleaf weeds:

2 - 4 leaf stage: Annual sunflower, ball mustard, burdock, cocklebur, field horsetail, flixweed, hoary cress, kochia, mustards, plantain, prickly lettuce, ragweeds, Russian pigweed, shepherd's-purse, vetch, and wild radish.

Less than 10 cm tall or across: Canada thistle, corn spurry, cow cockle, green smartweed, hemp-nettle, lady's-thumb, lamb's-quarters, redroot pigweed, Russian thistle, stinkweed, volunteer rapeseed and wild mustard. Weeds that emerge after application will not be controlled.

Chickweed: 1 - 6 leaf stage.

Wild buckwheat: 1 - 3 leaf stage.

Note: Treatment at the 3 - 4 leaf stage of crops and weeds usually combines maximum crop tolerance and weed susceptibility. Some broadleaf weeds may not be controlled if infestation is heavy, weeds are in bud or weather is dry and cool. Under stressed conditions and/or heavy crop canopy, earlier application will result in improved grassy weed control.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate: Champion FM: 0.81 L/ac. Plus: 8.1 g/ac.

Water volume: 45 L./ac.

Pressure: Ground 275 kPa.

Nozzles: Only 110° or 80° stainless steel flat fan nozzles are recommended. Uniform, thorough coverage is important to achieve good control.

Mixing instructions:

1. Ensure that the spray tank is thoroughly clean.
2. Fill the tank with half the required amount of water and start agitation or bypass system.
3. Slowly add the correct amount of Plus (container #1) to the spray tank. Agitate thoroughly until Plus is completely in suspension.
4. Add the correct amount of Champion FM (container #2) and continue agitation.
5. Triple rinse containers into the spray tank.
6. Add the remaining amount of water while agitation continues. Spray out immediately. Spray mixture should not be left in the tank overnight.
7. On repeat loads, prepare a Plus (container 1) slurry in water by slowly adding the correct amount of Plus to 20 L of water and add to the spray tank. Agitate thoroughly until Plus is completely is suspension. Repeat steps 4, 5, and 6.

Sprayer clean-up:

When moving into wheat, barley, spring or fall rye immediately following the application of Champion Plus Tank Mix, clean the sprayer by thoroughly flushing with a water/detergent mixture.

Note: Broadleaf crops can be damaged by Champion Plus tank mix residues in the spray tank even after a number of applications of a different product. It is critical to thoroughly clean and remove all traces of Champion Plus tank mix from the spray tank prior to moving into a broadleaf crop.

When moving into broadleaf crops: In all cases, prior to spraying a broadleaf crop (such as canola, peas, lentils, alfalfa, sugar beets, vegetables, etc.), complete a thorough cleaning of the tank, because the Plus component of Champion Plus Tank Mix can cause crop injury to sensitive crops at very low concentrations. Follow the clean-up instructions below to ensure adequate sprayer cleaning and removal of the Champion Plus Tank Mix.

Clean-up instructions prior to spraying broadleaf crops:

1. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
2. Drain tank and flush tank, boom and hoses with clean water for a minimum of ten minutes. Visually inspect tank to assure removal of all residues. If necessary, repeat step.
3. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum 3% ammonia) per 100 L of water. Flush solution through boom and hoses, and then add more water to completely fill tank. Allow to sit for 15 minutes with agitation. Again, flush the hoses, boom and nozzles with cleaning solution and drain tank.
4. Repeat step 3.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** During periods of stress, plants are not actively growing. When daytime temperatures before or after application are very hot (28°C or 82°F) and/or conditions are very dry and/or there is low humidity, plants are under stress. Application of Champion Plus tank mix during these periods may result in substantially reduced control. Application of the spray at a forward angle of 45° will result in better penetration of the canopy and better coverage. Do not apply to crop that is stressed by severe weather conditions, frost, low fertility, drought, water saturated soils, disease or insect damage as crop injury may result. A time interval of seven (7) days prior to application of Champion Plus is required before another pesticide can be applied.

9. **How it Works:**

   Fenoxprop-p-ethyl: Contact as well as systemic, no soil activity. Regions of high meristematic activity such as root and shoot tips are known to be affected.

   MCPA, 2,4-D: Disrupts cell division and causes abnormal growth responses that affect respiration and food reserves.

   Thifensulfuron: Absorbed by foliage. Inhibits cell elongation.

10. **Expected Results:** Grassy weeds: reduction of leaf growth and chlorotic blotching within 1 - 3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and complete death within 14 - 21 days after application. Broadleaf weeds – growth stops almost immediately. Discoloration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed susceptibility. **Poor results may be expected if** improper mixing, timing, coverage or when weeds are under drought stress.

11. **Effects of Rainfall:** Do not apply Champion Plus if rain is expected within 2 hours.

12. **Movement in Soil:** Fenoxaprop-p-ethyl appears to undergo rapid hydrolysis in the soil. Thifensulfuron moves very little in the soil and has a very short life in the soil.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields prior to harvest. Preharvest interval 50 days.

14. **Toxicity:**

    Fenoxaprop-p-ethyl + MCPA ester: Acute oral LD_{50} (rats) (mg/kg) = 2940.

    Thifensulfuron: Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) is greater than 5000.

    2,4-D: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (300 - 1200). Some formulations may cause skin irritation. Some formulations are toxic to fish. May cause burns and can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Keep away from fire or open flame or other sources of heat. Cannot be stored below freezing. If stored for 1 year or longer, shake well before using.

Champion Plus (cont'd)

17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Odyssey, Pursuit, Unity, Refine Extra, the DF component of Laser DF, and the Plus component of Triumph Plus or Champion Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Odyssey, Pursuit, Unity, Triumph Plus and Refine Extra with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.
 Some naturally occurring biotypes of wild oats and green foxtail have been identified in Western Canada that are resistant to Champion Plus Tank Mix and related products (those with the same mode of action). Selection of resistant biotypes, through repeated use of these herbicides, may result in control failures. To delay selection for resistant populations of weeds, rotate the use of Champion Plus Tank Mix with herbicides that have a different mode of action or cultural practices effective in controlling these weeds. If poor performance cannot be attributed to adverse weather conditions or improper application methods, a resistant biotype may be present. If resistance is suspected, contact your local representative of DuPont Canada Inc. Canada Inc. for assistance. If resistance is identified, additional treatments with Champion Plus Tank Mix or related herbicides will be ineffective and are not recommended.

Crossfire *(tribenuron methyl + metribuzin)*

Group 2,5

Manufacturer: **DuPont Canada Inc.**

CAUTION POISON

1. **Formulations:** TBM75 Herbicide, tribenuron methyl 75%; 4 x 40.5 g water soluble pouches: FIRE DF Herbicide, metribuzin dry flowable 75%; 4 x 540 g water soluble pouches. Bag-in-a-bag; 4 water soluble pouches, each containing 540 g metribuzin dry flowable 75% and also containing 1 water soluble pouch filled with 40.5 g tribenuron methyl dry flowable 75%.
2. **Registered Mixes: Crossfire Herbicide Tank Mix must be used only as a tank mix with MCPA Amine. Do not use Crossfire alone.** Directions for the proper use of Crossfire Herbicide Tank Mix appear on the label attached to the TBM75 Herbicide Portion of the tank mix.

   Mixing instructions: Add one-half of the necessary volume of water to the spray tank. With the agitator running, add the required number of FIRE ® DF Herbicide Toss-N-Go pouches. When the FIRE ® DF Herbicide is in suspension, add the required number of TBM75 ® Herbicide Toss-N-Go pouches. Add the remaining water. Add the appropriate amount of MCPA Amine last. Continuous agitation is required.
3. **Crops:** Spring wheat (excluding durum) and spring barley.
4. **Weeds Controlled by the Tank Mix:**

   Canada thistle (top growth control)
   common chickweed
   (including sulfonylurea-tolerant populations)
   hemp-nettle
   lamb's-quarters
   stinkweed
   volunteer canola (including smart-trait)
   wild mustard
5. **Weeds Suppressed by the Tank Mix:** Annual sow-thistle, wild buckwheat.
6. **When Used:**

   Crop: Apply the tank mix from the 2 leaf to 5 leaf stage of spring wheat (excluding durum) and spring barley. For best crop safety, apply at mid-tillering or sooner. Do not use on the Klondike variety of barley, or barley varieties with Klondike parentage, such as AC Lacombe.

   Weeds: For best results, apply to young actively growing weeds that are less than 10 cm tall or across and before the crop canopy closes. Weeds that emerge after treatment will not be controlled.
7. **How to Apply:**

   With: Ground equipment only. Do not apply by air.

   Rate: 4 g/ac TBM75 ® Herbicide + 53 g/ac FIRE ® DF Herbicide + 0.22 L/ac MCPA 500 amine.

Surfactant: None.

Water volume: 40 L/ac minimum.

Pressure: Do not exceed 275 kPa spray pressure.

Nozzles: Flat fan nozzles, 80° or 110°. Use 50 mesh filter screens or larger (metal or nylon).

Sprayer clean-up:

1. Drain tank, then flush tank, boom and hoses with clean water for a minimum of ten minutes to remove all visible residues.
2. Fill the tank with clean water, then add 1 liter of household ammonia (containing a minimum of 3% ammonia) per 100 liters of water. Fill the boom and hoses with solution and allow the sprayer to sit for 15 minutes. Drain.
3. Repeat step 2.
4. Nozzles and screens should be removed and cleaned separately. To remove traces of ammonia, rinse the tank, hoses and booms thoroughly with clean water.
5. Dispose of tank rinseate according to Provincial directions.

Caution: Do not use ammonia with chlorine bleach. Using ammonia with chlorine bleach will release a gas with a musty chlorine odour which can cause eye, nose, throat and lung irritation. Do not clean equipment in an enclosed area.

8. **Application Tips:** When applying sequentially with a wild oat herbicide, if not specified on the wild oat herbicide label, allow 4 - 5 day interval after the application of the wild oat product or 7 days before the wild oat product. Control depends on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions. Warm, moist growing conditions promote active weed growth and enhance the activity of the CROSSFIRE ® Herbicide tank mixture by allowing maximum foliar uptake and contact activity. If the spray preparation is left standing without agitation, thoroughly agitate the mixture to resuspend the mixture before spraying. Do not allow the mixture to stand for more than an hour without agitation. Uneven application such as swath overlapping, variable tractor speed, spraying on turns, etc. may result in crop injury and increase injury to rotating crops.

9. **How it Works:** Absorbed by foliage, inhibits photosynthesis as well as cell elongation.

10. **Expected Results:** CROSSFIRE ® Herbicide tank mixture rapidly stops growth of common chickweed, including sulfonylurea tolerant populations. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 - 3 weeks after application. Herbicide activity may be delayed by cold, dry conditions after application.

11. **Effects of Rainfall:** If rain occurs soon after application, control may be reduced. If heavy rains occur soon after application, plant injury may result, especially in poorly drained areas where water may stand for several days. At least 4 - 6 hours of dry weather is needed to allow CROSSFIRE ® Herbicide tank mixture to be absorbed by weed foliage. Environmental conditions that slow the drying of the spray mixture on the foliage such as high relative humidity, cool air temperatures or cloud cover may increase the time required.

12. **Movement in Soil:** Do not use on muck soil or subsequent crops may be injured.

13. **Grazing and Cropping Restrictions:**

    Cropping: Rotation crops such as onions, celery, peppers, cole crops, lettuce, spinach, sugar beets, table beets, turnips, pumpkin, squash, cucumbers, melons, tobacco and canola may be injured if planted both during the year of application or the following crop year.

    Grazing: Do not graze or feed crop to livestock within 30 days of application.

    Harvest: Do not apply within 60 days of harvest.

14. **Toxicity:** Slightly toxic by inhalation (LC_{50} (rats) 4 hours, is greater than 885 mg/m^3). Slightly toxic by ingestion (LD_{50}, (rats) is 2795 mg/kg). Contact eye irritant (rabbits).

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **If inhaled**, remove individual from site of exposure to fresh air. Consult a physician or poison control center.

M121

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Crossfire (cont'd)

16. **Storage:** Store in a cool, dry place. Keep away from fire, heat or open flame.
17. **Resistance Management:** Use of this tank mixture as directed will reduce the risk of selecting resistant biotypes of the species listed on this label. To further manage or delay the selection of resistant weed populations, rotate the use of this herbicide mixture with other herbicides with a different mode of action that are effective on the same weeds. Avoid using this herbicide mixture repeatedly on the same field and integrate tillage or other methods of mechanical weed control into your weed control programs wherever practical. Maintain good herbicide use records for each of your fields and prevent movement of resistant weed seeds to other fields by cleaning harvesting and tillage equipment and planting clean seed.

Curtail M *(clopyralid + MCPA ester)*

Group 4

Manufacturer **Dow AgroSciences Canada Inc.**

1. **Formulations:** Emulsifiable concentrate; 50 g a.e./L; clopyralid, + 280 g a.e./L MCPA ester 2 x 8 L jug.
2. **Registered Mixes:**

   Spring wheat: Assert 300.

   Spring and durum wheat: Horizon, Puma, Puma Super.

   Spring wheat and barley: Avenge 200C, Refine Extra.

   Spring wheat, durum wheat and barley: Achieve 80DG.
3. **Crops:** Wheat (hard red spring, Canada prairie soft, durum, soft white spring, utility), barley, oats.

   Underseeding: Do not apply to crops underseeded to legumes or companion crops.
4. **Weeds Controlled:**

[illegible]

annual sow-thistle (8.7)
Canada thistle (8.1)*
common groundsel (9.0)
dandelion (7.4)**
flixweed**
kochia (suppression) (2 - 4 leaf)
lamb's-quarters (9.0)
perennial sow-thistle (top growth)(8.6)
redroot pigweed (7.7)
Russian pigweed
scentless chamomile (2 - 4 leaf)
smartweed (7.9)
shepherd's-purse**
stinkweed (9.0)**
tartary buckwheat
volunteer canola (9.0)
wild buckwheat (8.2)
wild mustard (9.0)

[illegible]

Canada thistle (light infestations)(8.1)*
flixweed (spring seedlings 2 - 4 leaf)
lamb's-quarters
shepherd's-purse (spring seedlings 2 - 4 leaf)
stinkweed (spring seedlings 2 - 4 leaf)(9.0)
volunteer sunflower
wild mustard

*Season-long control, with some regrowth in the fall.

**spring rosettes only.

5. **Weeds Suppressed:** None.
6. **When Used:**

   Cereals: 3 leaf just before flag leaf.

Crossfire (cont'd)

16. **Storage:** Store in a cool, dry place. Keep away from fire, heat or open flame.
17. **Resistance Management:** Use of this tank mixture as directed will reduce the risk of selecting resistant biotypes of the species listed on this label. To further manage or delay the selection of resistant weed populations, rotate the use of this herbicide mixture with other herbicides with a different mode of action that are effective on the same weeds. Avoid using this herbicide mixture repeatedly on the same field and integrate tillage or other methods of mechanical weed control into your weed control programs wherever practical. Maintain good herbicide use records for each of your fields and prevent movement of resistant weed seeds to other fields by cleaning harvesting and tillage equipment and planting clean seed.

Curtail M *(clopyralid + MCPA ester)*

Group 4

Manufacturer: **Dow AgroSciences Canada Inc.**

1. **Formulations:** Emulsifiable concentrate; 50 g a.e./L: clopyralid, + 280 g a.e./L MCPA ester 2 x 8 L jug.
2. **Registered Mixes:**

   Spring wheat: Assert 300.

   Spring and durum wheat: Horizon, Puma, Puma Super.

   Spring wheat and barley: Avenge 200C, Refine Extra.

   Spring wheat, durum wheat and barley: Achieve 80DG.
3. **Crops:** Wheat (hard red spring, Canada prairie soft, durum, soft white spring, utility), barley, oats.

   Underseeding: Do not apply to crops underseeded to legumes or companion crops.
4. **Weeds Controlled:**

800 mL/ac

annual sow-thistle (8.7)
Canada thistle (8.1)*
common groundsel (9.0)
dandelion (7.4)**
flixweed**
kochia (suppression) (2 - 4 leaf)
lamb's-quarters (9.0)
perennial sow-thistle (top growth)(8.6)
redroot pigweed (7.7)
Russian pigweed
scentless chamomile (2 - 4 leaf)
smartweed (7.9)
shepherd's-purse**
stinkweed (9.0)**
tartary buckwheat
volunteer canola (9.0)
wild buckwheat (8.2)
wild mustard (9.0)

600 mL/ac

Canada thistle (light infestations)(8.1)*
flixweed (spring seedlings 2 - 4 leaf)
lamb's-quarters
shepherd's-purse (spring seedlings 2 - 4 leaf)
stinkweed (spring seedlings 2 - 4 leaf)(9.0)
volunteer sunflower
wild mustard

*Season-long control, with some regrowth in the fall.
**spring rosettes only.

5. **Weeds Suppressed:** None.
6. **When Used:**

   Cereals: 3 leaf just before flag leaf.

Broadleaf weeds: 1 - 4 leaf stage of growth.

Canada thistle: 10 - 15 cm in height.

7. **How to Apply:**

With: Ground equipment only. **Do not** apply by air.

Rate: 800 mL/ac. Under low Canada thistle population and easier to control weeds – 600 mL/ac.

Tank mix with Achieve 80DG: Barley and spring wheat: Apply 800 mL/ac Curtail M plus 100 gm/ac Achieve 80DG and surfactant recommended with Achieve 80DG.

Tank mix with Avenge 200-C: Apply 800 mL/ac Curtail M plus 1.75 L/ac of Avenge 200-C for medium to heavy populations of wild oats, Canada thistle and susceptible broadleaf weeds. Apply 670 mL/ac Curtail M plus 1.41 L/ac Avenge 200-C for low population of wild oats, light infestations of Canada thistle and easier to control broadleaf weeds listed on Curtail M label.

Water volume: 40 - 60 L/ac.

Pressure: 275 kPa.

Nozzles: Flat Fan type. Use 50 mesh or larger screens.

Mixing instructions: Clean spray tank and add ½ required amount of water. With agitator running, add the required amount of Curtail M. Add the remaining amount of the water and continue to agitate while spraying.

Tank mix with Achieve 80DG: Follow mixing and spraying instructions on Achieve label. Use surfactant listed on Achieve label.

Tank mix with Avenge 200-C: Fill spray tank ½ to ¾ full with clean filtered water and with agitator running, add required quantity of Curtail M followed by Avenge 200-C. Add remainder of water and circulate the spray mixture in tank for 5 minutes before spraying.

8. **Application Tips:** When weeds are under extreme drought stress or showing effects of excessive moisture, control can be reduced or delayed. Weed escapes may occur under prolonged stress conditions or low fertility. Do not apply to weeds stressed for more than 20 days due to lack of moisture as unsatisfactory control can result. Ensure uniform spray coverage over the entire area of target weeds.

9. **How it Works: Clopyralid** is a growth regulator type of herbicide. It is primarily absorbed through the foliage and is translocated to all parts of the plant causing leaf and stem twisting and yellowing and then death. **MCPA** is a systemic herbicide for broadleaf weeds which is translocated throughout the plant causing rapid undifferentiated growth, which usually results in the death of susceptible weeds.

10. **Expected Results:**

Broadleaf Weeds: Weeds start to twist after spraying, and after twisting and bending, plants turn brown and die.

Difficult to control weeds such as Canada thistle and wild buckwheat stop growing, change color to dark green and then turn yellow before they die. Death may not occur for 14 - 21 days after application. Some weak Canada thistle regrowth may occur by end of season.

11. **Effects of Rainfall:** Do not apply if rain is expected in 6 hours.

12. **Movement in Soil:** MCPA is readily leached from soil. Clopyralid is somewhat soluble in water, but it is generally not mobile in soil under typical prairie conditions.

13. **Grazing and Cropping Restrictions:** Do not cut or graze treated fields of wheat, barley or oats within 7 days of application.

Succeeding crops: Fields previously treated with Curtail M Herbicide Tank Mix can either be seeded to wheat, barley, oats, rye, corn, flax, canola, sugar beets, mustard, forage grasses or should be summerfallowed. Do not seed crops other than those listed above for at least one year following treatment. Do not seed pea, lentil, sunflower, bean, alfalfa or clover crops for one year following treatment.

14. **Toxicity:**

Clopyralid: Very low acute mammalian toxicity. Acute oral LC_{50} (rats) = greater than 2,000 mg/kg. Acute oral LD_{50} (bees) = greater than 100 g/bee. Extremely toxic to fish.

Curtail M (cont'd)

MCPA: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700 - 880). Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **If inhaled**, remove individual from site of exposure to fresh air. Consult a physician or poison control center.
16. **Storage:** Dry heated storage preferred.

Diphenoprop BK700

(2,4-D + dichlorprop)

Group 4

Manufacturer: United Agri Products

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; 329 g/L 2,4-D + 350 g/L dichlorprop; 10 L, 115 L, 205 L containers.
2. **Registered Mixes:** DyCleer.

   Mixing instructions: Add 1/2 amount of carrier, start agitation, add herbicide, add rest of carrier. If used in oil, do not let water get in mixture.
3. **Crops:** Non-crop areas, industrial areas, rights of way and roadsides.

   Underseeding: Not applicable.
4. **Weeds Controlled:**

Brush

alder
aspen
balsam fit
basswood
birch
blueberry
buckbrush
bur oak
elderberry
elm
ground juniper
hardhack
hawthorn
hazel
hickory
honeysuckle
Manitoba maple
poison-ivy
poplar
red pine
Scotch pine
silver maple
sumac
tamarac
tame raspberry
white cedar
white oak
wild apple
wild cherry
wild plum
wild raspberry
willow

Weeds

alfalfa
broadleaf weeds (most annual)
bull thistle
burdock
buttercup
Canada thistle
chicory
cinquefoil
dandelion
curled dock
dogbane
goat's-beard
goldenrod
hawkweed
horsetail
mullein
perennial sow-thistle
plantain
sweet clover
tansy
vetch
teasel
wild carrot
yellow rocket

5. **Weeds Suppressed:** Milkweed, rose, sugar maple, toadflax.
6. **When Used:** Throughout growing season.

Curtail M (cont'd)

MCPA: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700 - 880). Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **If inhaled**, remove individual from site of exposure to fresh air. Consult a physician or poison control center.
16. **Storage:** Dry heated storage preferred.

Diphenoprop BK700

(2,4-D + dichlorprop)

[illegible] **Group 4**

Manufacturer **United Agri Products**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; 329 g/L 2,4-D + 350 g/L dichlorprop; 10 L, 115 L, 205 L containers.
2. **Registered Mixes:** DyCleer.

   Mixing instructions: Add 1/2 amount of carrier, start agitation, add herbicide, add rest of carrier. If used in oil, do not let water get in mixture.
3. **Crops:** Non-crop areas, industrial areas, rights of way and roadsides.

   Underseeding: Not applicable.
4. **Weeds Controlled:**

[illegible]

alder
aspen
balsam fit
basswood
birch
blueberry
buckbrush
bur oak
elderberry
elm
ground juniper
hardhack
hawthorn
hazel
hickory
honeysuckle
Manitoba maple
poison-ivy
poplar
red pine
Scotch pine
silver maple
sumac
tamarac
tame raspberry
white cedar
white oak
wild apple
wild cherry
wild plum
wild raspberry
willow

[illegible]

alfalfa
broadleaf weeds (most annual)
bull thistle
burdock
buttercup
Canada thistle
chicory
cinquefoil
dandelion
curled dock
dogbane
goat's-beard
goldenrod
hawkweed
horsetail
mullein
perennial sow-thistle
plantain
sweet clover
tansy
vetch
teasel
wild carrot
yellow rocket

5. **Weeds Suppressed:** Milkweed, rose, sugar maple, toadflax.
6. **When Used:** Throughout growing season.

7. **How to Apply:**

   With: Aircraft, power equipment, knapsack sprayer.

   Rate: Brush: 7.0 - 11.0 L in 1000 L of water for foliage stem treatment. Weeds: 2.3 - 6.7 L/ac.

   Water volume: Spray to point of runoff. For fixed wing application – 8 L/ac minimum. Water may be replaced by oil.

   Pressure: As recommended for equipment used.

   Nozzles: Flat fan recommended.

8. **Application Tips:** Forms an emulsion in water – agitate to prevent separation.

9. **How it Works:** A translocated, systemic herbicide absorbed by leaves.

10. **Expected Results:** Leaves brown and wilt shortly after spraying – no leaves appear the following year.

11. **Effects of Rainfall:** Rain within 3 or 4 hours after application may reduce control.

12. **Movement in Soil:** Leaching does not pose a problem.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Drift: Over susceptible crops, causes injury.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 2,4-D (300 - 1,000); dichlorprop (800). Do not apply when bees are foraging. Toxic to bees. May cause burns and may be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** If frozen, warm to 5°C and mix well.

    Note: Similar products are Estaprop/Turboprop 600.

Dual *(metolachlor)*

[illegible] **Group 15**

Manufacturer **Novartis Crop Protection Canada Inc**

1. **Formulations:** Emulsifiable Concentrate; 960 g/L; 2 x 10 L jugs.

2. **Registered Mixes:** May be applied as split application or tank mixed as follows. With Aatrex Liquid, Aatrex Nine-O or Bladex formulations. Estemine 2,4-D: split application only. Liquid nitrogen – 28% nitrogen solutions or complete liquid fertilizers may replace all or part of the water for pre-plant incorporated or pre-emergent application of Dual tank mixes in corn. Dry Bulk Granular Fertilizers – impregnate on fertilizer, apply to the soil, then incorporate to 5 cm.

   Mixing restrictions: Do not tank mix with Banvel, Estemine 2,4-D. Do not impregnate on nitrate fertilizers (ammonium, potassium, sodium, calcium) or on single superphosphate (0-26-0), triple superphosphate (0-46-0) or on ammonium phosphate or on limestone. Fertilizer blends containing limestone may be impregnated. For tank mixes for crops other than corn, refer to Dual label.

3. **Crops:** Beans (snap); corn (all types); dry common beans (white, kidney, pinto); fruit trees, second year or older [poplar, spruce (white, black, Norway)]; lima beans; peas (processing); pine (white, red, Jack); potatoes (except Superior); soybeans; sugar beets; sweet white lupins; transplanted tomatoes.

4. **Weeds Controlled:** Barnyard grass, green and yellow foxtail plus weeds controlled by the second material in mix or oversprayed, nightshade (American, Eastern Black), crabgrass (smooth, hairy), fall panicum, old witchgrass, yellow nutsedge.
5. **Weeds Suppressed:** Redroot pigweed.
6. **When Used:** Pre-plant incorporated or irrigated within 10 days if applied pre-emergent.
7. **How to Apply:**

With: Ground equipment: band or overall spray.

Rate: Corn, potatoes, sugar beets: 0.8 - 1.1 L/ac. Snap beans, soybeans: 0.7 - 1.1 L/ac.
Corn: Tank mixes of Dual 960 EC at above rate plus:

[illegible]	[illegible]	[illegible]	[illegible]
Annual grasses and broadleaf weeds	Aatrex Nine-0 – 0.5 - 0.7 kg/ac or Aatrex Liquid – 0.9 - 1.3 L/ac or Bladex Liquid – 1.5 - 1.9 L/ac or Bladex Nine-T – 0.9 kg/ac	Aatrex Nine-0 – 0.5 - 0.7 kg/ac or Aatrex Liquid – 0.9 - 1.3 L/ac or Bladex Liquid – 1.7 - 2.0 L/ac or Bladex Nine-T – 1.1 kg/ac	Kilmor – 345 - 445 mL/ac or Estemine 2,4-D – 285 - 445 mL/ac

Water volume: 70 - 140 L/ac.

Incorporation: Incorporate to 5 cm. Do not exceed this depth since product dilution can occur. If using tandem discs, set to cut to a depth of 10 cm operated at 6 - 9 km/h. If using vibrating shank cultivators with overlapping sweeps, set 10 cm deep and operate at 10 - 13 km/h. Spike tooth or diamond tooth harrows are good incorporation equipment. Immediate incorporation is not necessary although desirable.

Pressure: 200 - 300 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** For band treatments, use a press wheel ahead of the nozzle to level the band.
9. **How it Works:** Inhibits germination, particularly grasses.
10. **Expected Results:** Annual grasses do not germinate or under dry conditions, may die back soon after emergence.
11. **Effects of Rainfall:** Moisture required to move chemical to area of germination but an excess may move it below this area.
12. **Movement in Soil:** Some movement may occur if excess moisture on light soils.
13. **Grazing and Cropping Restrictions:** Do not apply on muck, peat or high organic soils or after growth has begun. Winter cereals may be seeded 4.5 months after treatment.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (2,780), Dual (2,690). Prolonged exposure may cause eye injury. Slightly toxic to birds; non-toxic to fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage required.

DyCleer *(dicamba)*

Group 4

Manufacturer: **Novartis Crop Protection Canada Inc.**

WARNING POISON

1. **Formulations:** Liquid; 480 g/L; 10 L jug.
2. **Registered Mixes:** 2,4-D (Amine, LV Ester); 2,4-D + dichlorprop (Desormone LV 700, Diphenoprop BK700, Turboprop 600).

   Roundup and Roundup + 2,4-D: For roadside vegetation control.

   Mixing restrictions: Do not mix with oils. Use aerial tank mixes only on aspen poplar and white birch.
3. **Crops:** Non-crop areas such as roadsides, utility rights of way, railways and turf (established).
4. **Weeds Controlled:**

Weeds

[illegible] L/ac DyCleer (Turf)	[illegible] L/ac DyCleer	[illegible] L/ac DyCleer	3.7 L/ac DyCleer
clover	Canada thistle	diffuse knapweed	baby's breath
erect knotweed	common ragweeds	goat's-beard	fringed sage brush
mouse-eared chickweed	English daisy	ground cherry	lambkill
sheep sorrel	false ragweeds	pasture sage	velvet grass
0.85 L/ac DyCleer +	field bindweed	poverty weed	
1.8 L/ac 2,4-D Amine 500	giant ragweeds	sheep sorrel	
wild carrot	goldenrod	thyme-leaved spurge	
	perennial sow-thistle		
	tansy ragwort		

Brush: Rates /1000 L of water

Group 1: 2.1 L DyCleer + [illegible]			
alder	cherry	wild rose	
aspen poplar	western snowberry	wolf willow	

Group 2: [illegible] L DyCleer + [illegible]			
balsam fir	bur oak	pine	tamarack
balsam poplar	elm	red oak	vine maple
birch	hickory	spruce	white cedar
black cottonwood			

Group 3: [illegible] L DyCleer + [illegible]			
sugar maple	white ash		

5. **Weeds Suppressed:** Top growth control.

[illegible] L/ac DyCleer		[illegible] L/ac DyCleer	3.7 L/ac DyCleer
absinthe	perennial sow-thistle	curled dock	bracken fern
Canada thistle	poverty weed		perennial cinquefoil
leafy spurge	scentless chamomile		Russian knapweed

Dual (cont'd)

4. **Weeds Controlled:** Barnyard grass, green and yellow foxtail plus weeds controlled by the second material in mix or oversprayed, nightshade (American, Eastern Black), crabgrass (smooth, hairy), fall panicum, old witchgrass, yellow nutsedge.
5. **Weeds Suppressed:** Redroot pigweed.
6. **When Used:** Pre-plant incorporated or irrigated within 10 days if applied pre-emergent.
7. **How to Apply:**

With: Ground equipment: band or overall spray.

Rate: Corn, potatoes, sugar beets: 0.8 - 1.1 L/ac. Snap beans, soybeans: 0.7 - 1.1 L/ac.
Corn: Tank mixes of Dual 960 EC at above rate plus:

Weeds controlled	Tank mixes for corn (Qty/ac) pre-plant	Split application pre-emergent (under irrigation only)	Post-emergent
Annual grasses and broadleaf weeds	Aatrex Nine-0 – 0.5 - 0.7 kg/ac	Aatrex Nine-0 – 0.5 - 0.7 kg/ac	Kilmor – 345 - 445 mL/ac
	or	or	or
	Aatrex Liquid – 0.9 - 1.3 L/ac	Aatrex Liquid – 0.9 - 1.3 L/ac	Estemine 2,4-D – 285 - 445 mL/ac
	or	or	
	Bladex Liquid – 1.5 - 1.9 L/ac	Bladex Liquid – 1.7 - 2.0 L/ac	
	or	or	
	Bladex Nine-T – 0.9 kg/ac	Bladex Nine-T – 1.1 kg/ac	

Water volume: 70 - 140 L/ac.

Incorporation: Incorporate to 5 cm. Do not exceed this depth since product dilution can occur. If using tandem discs, set to cut to a depth of 10 cm operated at 6 - 9 km/h. If using vibrating shank cultivators with overlapping sweeps, set 10 cm deep and operate at 10 - 13 km/h. Spike tooth or diamond tooth harrows are good incorporation equipment. Immediate incorporation is not necessary although desirable.

Pressure: 200 - 300 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** For band treatments, use a press wheel ahead of the nozzle to level the band.
9. **How it Works:** Inhibits germination, particularly grasses.
10. **Expected Results:** Annual grasses do not germinate or under dry conditions, may die back soon after emergence.
11. **Effects of Rainfall:** Moisture required to move chemical to area of germination but an excess may move it below this area.
12. **Movement in Soil:** Some movement may occur if excess moisture on light soils.
13. **Grazing and Cropping Restrictions:** Do not apply on muck, peat or high organic soils or after growth has begun. Winter cereals may be seeded 4.5 months after treatment.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (2,780), Dual (2,690). Prolonged exposure may cause eye injury. Slightly toxic to birds; non-toxic to fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage required.

DyCleer *(dicamba)*

Group 4

Manufacturer: **Novartis Crop Protection Canada Inc.**

WARNING POISON

1. **Formulations:** Liquid: 480 g/L; 10 L jug.
2. **Registered Mixes:** 2,4-D (Amine, LV Ester); 2,4-D + dichlorprop (Desormone LV 700, Diphenoprop BK700, Turboprop 600).

   Roundup and Roundup + 2,4-D: For roadside vegetation control.

   Mixing restrictions: Do not mix with oils. Use aerial tank mixes only on aspen poplar and white birch.
3. **Crops:** Non-crop areas such as roadsides, utility rights of way, railways and turf (established).
4. **Weeds Controlled:**

Weeds

0.50 L/ac DyCleer (Turf)

clover
erect knotweed
mouse-eared chickweed
sheep sorrel

0.85 L/ac DyCleer +
1.8 L/ac 2,4-D Amine 500

wild carrot

0.95 L/ac DyCleer

Canada thistle
common ragweeds
English daisy
false ragweeds
field bindweed
giant ragweeds
goldenrod
perennial sow-thistle
tansy ragwort

1.90 L/ac DyCleer

diffuse knapweed
goat's-beard
ground cherry
pasture sage
poverty weed
sheep sorrel
thyme-leaved spurge

3.7 L/ac DyCleer

baby's breath
fringed sage brush
lambkill
velvet grass

Brush: Rates /1000 L of water

Group 1: 2.1 L DyCleer + (4.0 L 2,4-D Amine *or* 3.3 L 2,4-D Ester 600)

alder
aspen poplar
cherry
western snowberry
wild rose
wolf willow

Group 2: 4.0 L DyCleer + (8.0 L 2,4-D Amine *or* 6.6 L 2,4-D Ester 600)

balsam fir
balsam poplar
birch
black cottonwood
bur oak
elm
hickory
pine
red oak
spruce
tamarack
vine maple
white cedar

Group 3: 5.2 L DyCleer + 7.1 L (2,4-D + dichlorprop)

sugar maple
white ash

5. **Weeds Suppressed:** Top growth control.

0.50 L/ac DyCleer

absinthe
Canada thistle
leafy spurge
perennial sow-thistle
poverty weed
scentless chamomile

0.95 L/ac DyCleer

curled dock

3.7 L/ac DyCleer

bracken fern
perennial cinquefoil
Russian knapweed

DyCleer (cont'd)

6. **When Used:**

   Coniferous and Deciduous species: When leaves are fully expanded (spring-early summer) and stop applications at least 3 weeks prior to a change of leaf color in the fall.

   Broadleaf weeds: When actively growing, normally between May and July.

   Roadside vegetation control: Dycleer can be used in a tank mix with Roundup for annual vegetation control on 1 - 2 metre wide roadside shoulders. Dycleer tank mixes with Roundup and 2,4-D offer a broader spectrum of total control of roadside vegetation.

7. **How to Apply:**

   With: Aircraft or ground equipment. Thorough coverage essential.

   Rate: *See Weeds Controlled, Weeds Suppressed*. Rates vary depending on species.

   Roadside vegetation control:
   1. 0.5 - 1.06 L/ac Dycleer + 0.3 - 0.4 L/ac Roundup.
   2. 0.12 L/ac Dycleer + 0.49 L/ac 2,4-D (500 g/L) + 0.3 - 0.4 L/ac Roundup.

   Water volume: Aircraft: 35 L/ac minimum. Ground: Turf weeds: 45 L/ac; Weeds: 45 - 90 L/ac; Brush: rate/1000 L of water.

   Nozzles: Flat fan recommended.

8. **Application Tips:** Thorough coverage of weed and wetting brush to the point of runoff is essential for control. Brush and trees over 2 m should be cut and regrowth sprayed. Do not use on bentgrass. Do not rake, mow or water turf within 24 hours after treatment. 2,4-D Ester tank mix may improve brush control, especially under drought stress. Tank mix with 2,4-D (Amine or Ester) for control of a broader range of weeds. Avoid spraying if temperatures exceed 30°C, to reduce risk of vapour drift. Avoid spraying onto soil over root system of desirable trees and shrubs. Thoroughly clean application equipment after use.

9. **How it Works:** Dicamba is a systemic herbicide absorbed through roots or leaves and translocated in most plants. Disrupts the metabolic and growth activities in the plant.

10. **Expected Results:** Excellent control of brush can be expected within a year of application. Effect on broadleaf weeds may be seen in 10 - 14 days with twisting and bending of main stem, cupping of leaves, increase in root size and increase in fibrous roots.

11. **Effects of Rainfall:** Rainfall 4 hours after application will not reduce effectiveness.

12. **Movement in Soil:** Dicamba is more subject to leaching in sandy soils than in clay textured soils. During the growing season, the half-life of dicamba is less than 30 days.

13. **Grazing and Cropping Restrictions:** Use on non-crop areas such as roadsides, utility rights of way, railways, wasteland and similar areas.
    Pastures, Rangeland, Non-crop area (meat animals): If treated vegetation has been consumed by meat animals within 30 days of DyCleer application, feed the animal with untreated diet for 30 days before slaughter. Meat animals may graze or feed on treated pasture 30 days after DyCleer application without restrictions on slaughter.

    Grazing and hay restrictions (Dairy cattle): (Days=time between treatment and grazing or cutting.) Up to 500 mL/ac – 0 days, 501 - 930 mL/ac – 7 days, 931 mL/ac - 1.86 L/ac – 14 days, 1.87 - 2.87 L/ac – 30 days.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = dicamba DMA salt (2,600). Low toxicity to fish. Non-toxic to bees. May cause severe damage to eyes.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Freezing may cause crystalization but no activity is lost if completely resuspended.

DyVel *(dicamba + MCPA-K)*

Group 4

Manufacturer **BASF**

CAUTION POISON

1. **Formulations:** Water Soluble Solution; 84 g/L dicamba + 336 g/L MCPA-K; 2 x 10 L jugs.

2. **Registered Mixes:** Horizon in spring and durum wheat only.
(wild oats: 95 mL/ac + Score at 0.8% v/v; green and yellow foxtail: 115 mL/ac + Score at 1.0% v/v).

Mixing instructions: When using DyVel + Horizon, add DyVel first, followed by Horizon, then Score.

3. **Crops:** Barley (8.1), oats (9.0), wheat [spring (8.7), durum, winter].

Underseeding: Legume underseeding not recommended.

4. **Weeds Controlled:**

annual smartweeds (7.7)
annual sow-thistle (6.6)
ball mustard (8.1)
burdock
cleavers (7.2)
cocklebur
common ragweeds
corn spurry (5.6)
cow cockle
false ragweeds
flixweed
giant ragweeds
hare's-ear mustard (8.8)
hemp-nettle (6.5)
Indian mustard (8.8)
kochia (7.9)
lady's-thumb (8.1)
lamb's-quarters (8.5)
perennial sow-thistle (7.6)
prostrate pigweed
redroot pigweed (7.8)
Russian pigweed
Russian thistle (7.0)
shepherd's-purse
stinkweed (8.4)
tartary buckwheat (7.6)
tumble mustard (8.8)
volunteer canola (8.1)*
volunteer sunflower
wild buckwheat (7.7)
wild mustard (8.6)
wild radish
wormseed mustard

* Apply before bolting when this weed is at the 2 - 4 leaf stage.

5. **Weeds Suppressed:** Canada thistle (7.3) and sow-thistle top growth control, cleavers.

6. **When Used:**

Barley, oats, spring wheat (including durum): 2 - 5 leaf stage.

Winter wheat: Apply in spring when wheat is 15 - 25 cm tall or before shot blade stage. Weeds: Best results will be obtained on hemp-nettle and cow cockle if application is made at the 2 - 3 leaf stage and at the 2 - 3 whorl stage of corn spurry.

7. **How to Apply:**

With: Aircraft or ground equipment.

Rate: 500 mL/ac.

Water volume: Air: 8 L/ac minimum. Ground: 45 L/ac.

Pressure: Air: not above 200 kPa. Ground: 275 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** Best under good growing conditions and air temperature 10 - 25°C. Avoid application when crop is under stress from disease or adverse environmental conditions. Do not spray if rain is expected within 4 hours of application. Avoid application if frost or severe drop in night temperature is forecast. To prevent drift to sensitive crops, do not spray if temperatures are expected to exceed 30°C, when humidity is high or fog is present. Crop damage can occur if the chemical is applied at any time other than the recommended crop stage. Shortening of straw may occur without loss in yield.

9. **How it Works:** DyVel is a systemic herbicide absorbed through the roots and leaves and translocated readily.

10. **Expected Results:**

Weeds: Twisting, bending of main stem and leaf petioles, cupping of leaves or increase in root size occur within 10 - 14 days. **Poor results may be expected if** it rains within 4 hours of application, or when older weeds are sprayed or if less than recommended water volume is used.

11. **Effects of Rainfall:** Rainfall 4 hours after application will not reduce effectiveness.

12. **Movement in Soil:** At recommended rates, very little movement occurs.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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DyVel (cont'd)

13. **Grazing and Cropping Restrictions:** Allow 30 days after application of DyVel, or DyVel + Horizon, and grazing or cutting of cereal crop for hay.

    Suceeding crops: No restrictions.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = dicamba (2,629), MCPA (700). Non-toxic to birds, fish and bees. May cause burns and can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Protect from freezing, but if frozen, no activity is lost if completely resuspended.

DyVel DS *(2,4-D + mecoprop + dicamba)*

Group 4

Manufacturer **BASF**

CAUTION POISON

1. **Formulations:** Liquid; 295 g/L 2,4-D + 80 g/L mecoprop + 110 g/L dicamba; 2 x 10 L jugs.

2. **Registered Mixes:** Aatrex Liquid or Aatrex Nine-0 (corn), Puma Super.

3. **Crops:**

   barley (8.5)
   durum wheat (7.9)
   field corn (8.3)
   roadsides
   spring wheat (7.9)
   summerfallow
   stubble fields
   sweet corn (8.3)
   winter wheat (7.9)

   Underseeding: Do not apply to crops underseeded to legumes.

4. **Weeds Controlled:**

In crops

annual smartweeds (7.7)
annual sow-thistle
ball mustard
Canada thistle (7.5)
cocklebur
common ragweed
cow cockle (7.6)
corn spurry (7.3)
field bindweed*
flixweed (7.8)
hedge bindweed*
Jerusalem artichoke (in corn)
kochia
knotweed
lady's-thumb
lamb's-quarters (8.5)
perennial sow-thistle (8.6)
prostrate pigweed
redroot pigweed (7.7)
Russian thistle (7.3)
shepherd's-purse (8.6)
stinkweed (8.6)
tartary buckwheat
volunteer buckwheat
volunteer canola
volunteer mustard
wild buckwheat (8.1)
wild mustard (8.6)
wormseed mustard

Along roadsides

alders
chicory
bull thistle
goat's-beard
poison-ivy
ragwort
sheep-laurel
white cockle

* If applied to field bindweed when it is actively flowering.

5. **Weeds Suppressed:** Field bindweed, Canada thistle (7.5), cleavers (7.0), round-leaved mallow.

6. **When Used:**

   Barley: 2 - 3 true leaf stage.*

   Corn: Overall spray prior to 15 cm height of corn, use drop nozzles after 30 cm height.

   Roadsides: Spring when weeds are in 2 - 5 leaf stage and growing actively.

   Wheat (spring, durum): 3 - 5 true leaf stage.*

DyVel (cont'd)

13. **Grazing and Cropping Restrictions:** Allow 30 days after application of DyVel, or DyVel + Horizon, and grazing or cutting of cereal crop for hay.

    Suceeding crops: No restrictions.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = dicamba (2,629), MCPA (700). Non-toxic to birds, fish and bees. May cause burns and can be absorbed through the skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Protect from freezing, but if frozen, no activity is lost if completely resuspended.

DyVel DS *(2,4-D + mecoprop + dicamba)*

Group 4

Manufacturer: **BASF**

CAUTION POISON

1. **Formulations:** Liquid; 295 g/L 2,4-D + 80 g/L mecoprop + 110 g/L dicamba; 2 x 10 L jugs.
2. **Registered Mixes:** Aatrex Liquid or Aatrex Nine-0 (corn), Puma Super.
3. **Crops:**

barley (8.5)
durum wheat (7.9)
field corn (8.3)
roadsides
spring wheat (7.9)
summerfallow
stubble fields
sweet corn (8.3)
winter wheat (7.9)

Underseeding: Do not apply to crops underseeded to legumes.

4. **Weeds Controlled:**

In crops

annual smartweeds (7.7)
annual sow-thistle
ball mustard
Canada thistle (7.5)
cocklebur
common ragweed
cow cockle (7.6)
corn spurry (7.3)
field bindweed*
flixweed (7.8)
hedge bindweed*
Jerusalem artichoke (in corn)
kochia
knotweed
lady's-thumb
lamb's-quarters (8.5)
perennial sow-thistle (8.6)
prostrate pigweed
redroot pigweed (7.7)
Russian thistle (7.3)
shepherd's-purse (8.6)
stinkweed (8.6)
tartary buckwheat
volunteer buckwheat
volunteer canola
volunteer mustard
wild buckwheat (8.1)
wild mustard (8.6)
wormseed mustard

Along roadsides

alders
chicory
bull thistle
goat's-beard
poison-ivy
ragwort
sheep-laurel
white cockle

* If applied to field bindweed when it is actively flowering.

5. **Weeds Suppressed:** Field bindweed, Canada thistle (7.5), cleavers (7.0), round-leaved mallow.
6. **When Used:**

Barley: 2 - 3 true leaf stage.*

Corn: Overall spray prior to 15 cm height of corn, use drop nozzles after 30 cm height.

Roadsides: Spring when weeds are in 2 - 5 leaf stage and growing actively.

Wheat (spring, durum): 3 - 5 true leaf stage.*

Wheat (winter): In spring before crop is 30 cm high.

Summerfallow: When Canada thistle is in the early bud stage. Do not cultivate for a minimum of 4 weeks after treatment.

* All leaf stages refer to true leaf stage and tillers should not be counted as true leaves.

7. How to Apply:

With: Ground equipment.

Rate:

Barley: 340 mL/ac.

Wheat: 340 - 445 mL/ac.

Corn (sweet, field): 340 - 445 mL/ac.

Roadsides: 1.3 L/ac.

Crop free land (stubble, summerfallow): 445 - 710 mL/ac.

Tank mix: 345 - 445 mL/ac + (Aatrex Liquid: 910 mL/ac **or** Aatrex Nine-0: 506 g/ac.), 445 mL/ac + Puma Super (200 mL/ac) for control of broadleaf weeds and green foxtail.

Water volume: 40 L/ac for cereals; 80 - 140 L/ac for corn.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

8. Application Tips: Ensure that proper rate, water volume and timing are used; otherwise, crop injury may occur. Risk of crop injury increases as water volume drops below 36 L/ac. Do not apply when temperatures exceed 27°C and relative humidity is very high. Use the 445 mL/ac rate for hard to kill weeds, suppression of cleavers and round-leaved mallow, for top-growth control of Canada thistle, when weeds are at an advanced growth stage, when weed densities are high, or under adverse weather conditions. Use the 345 mL/ac rate for easy to kill weeds, when weed densities are low and growing conditions are optimum. Apply to weeds that are actively growing and are in the 2 - 3 leaf stage for best results.

9. How it Works: Accummulates in the growing points resulting in abnormal growth which disrupts the transport system in plants.

10. Expected Results:

Weeds: Visible effects occur 7 - 14 days after spraying. Leaves curl, leaf petioles twist, leaf edges turn brown, the whole plant ceases growth, eventually turns brown and dies.

Crop: Improper applications can result in abnormal bending at the internodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets. **Poor results may be expected** with overmature weeds, inadequate coverage or rainfall less than 4 hours after application.

11. Effects of Rainfall: Do not spray if rain is expected within 4 hours.

12. Movement in Soil:

2,4-D/mecoprop: Readily mobile in the soil.

Dicamba: Relatively mobile; mobility affected by capillary movement and/or surface evaporation. Concentration and location in the soil profile will be determined by total seasonal precipitation, its frequency and original herbicide dosage.

13. Grazing and Cropping Restrictions:

Drift: Tomatoes, sugar beets, sunflowers, beans, turnips, cauliflower, cabbage, ornamentals and fruit crops are very sensitive to drift.

Grazing restrictions: Do not permit lactating dairy animals to graze fields within 7 days. Do not harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Succeeding crops: No restrictions.

14. Toxicity: Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg formulated product) = 1,000. Non-toxic to fish and bees. Intake may cause convulsions.

DyVel DS (cont'd)

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage preferred. If frozen, shake thoroughly before use.

2,4-D *(amine, LV esters)*

Group 4

Manufacturer **Numerous Manufacturers**

WARNING POISON

1. **Formulations:** Liquids: Amines, LV esters.

   Amine 500: Amsol; 2,4-D Amine; Estemine 2,4-D; No-Weed 2,4-D. 470 g/L. 4 L, 2 x 10 L, 20 L containers.

   Amine 600: 2,4-D amine (560 g/L), 2 x 10 L containers.

   LV Ester 500: SEE - 2,4-D; 450 g/L; 2 x 10 L pack.

   LV Ester 600: 2,4-D LV Ester (600, 96); No-Weed 2,4-D; 564 g/L; 2 x 10 L pack, 115 L.

   LV Ester 700: 2,4-D LV Ester 700; 660 g/L; 20 L pails 2 x 10 L pack, 115 L, 205 L.

2. **Registered Mixes:**

   2,4-D Amine: Atrazine (non-crop areas); atrazine + dicamba + mecoprop (corn); bromoxynil (barley, wheat); dicamba [barley, corn, non-crop areas, pastures, rangeland, red fescue (for seed only), rye (spring), turf, wheat (spring, winter)]; dicamba + mecoprop (barley, wheat); mecoprop (turf); propanil [wheat (durum, spring)]; Sencor (barley, wheat); sodium TCA (barley, brush, flax).

   2,4-D Ester: Bromoxynil (barley, wheat); dicamba (non-crop areas, pastures, rangeland); dicamba + dichlorprop (non-crop areas, rangeland); dichlorprop (barley, non-crop areas, turf, wheat); difenzoquat (barley, Avenge wheat varieties); propanil [wheat (durum, spring)]; sodium TCA (brush).

   Note: Some formulations can be mixed with liquid fertilizer (28-0-0).

3. **Crops:**

   asparagus
   barley (9.0)
   corn
   established turf
   fall fallow stubble
   fall rye (8.9)
   grass pasture
   grasses
   non-crop areas
   rangeland
   spring rye (8.9)
   spring wheat (8.7)
   winter wheat (8.6)

   * Use only if crop is heavily infested with MCPA resistant weeds; crop injury may occur.

4. **Weeds Controlled:**

   Note: First rating amine; second rating ester.

   ball mustard (8.3)(8.2)
   bluebur
   burdock
   cocklebur
   common plantain
   common ragweed
   false ragweed
   flixweed (4.6)(7.4)**
   giant ragweed
   hare's-ear mustard (8.3)(8.2)
   Indian mustard (8.3)(8.2)
   kochia (5.9) (7.3)
   lamb's-quarters (8.0)(8.3)
   prickly lettuce
   Russian pigweed (7.0)
   shepherd's-purse (8.6)(8.0)**
   stinkweed** (7.2)(7.7)
   sweet clover
   thyme-leaved spurge
   tumble mustard (8.3)(8.2)
   vetch
   wild mustard (8.3)(8.2)
   wild radish
   wild sunflower
   wormseed mustard (8.3)(8.2)

[illegible]

- annual smartweeds (6.5)(5.5)
- common peppergrass
- common purslane
- curled dock
- dog mustard
- field peppergrass
- goat's-beard
- hairy galinsoga
- lady's-thumb
- redroot (-)(6.6) pigweed
- Russian thistle (8.0)(7.5)
- small-seeded false flax
- tansy mustard
- tumble pigweed
- oak-leaved goosefoot
- pineappleweed
- prostrate pigweed

** For the control of fall rosettes in stubble or fallow, apply to emerged weeds prior to freeze-up.

5. **Weeds Suppressed:** Top control or suppression.

- alfalfa
- annual sow-thistle (6.2)
- biennial wormwood
- blue lettuce
- Canada thistle (4.6)(5.4)
- creeping buttercup
- dandelion (3.0)(-)
- field bindweed
- field horsetail
- narrow-leaved hawk's-beard
- gumweed
- hedge bindweed
- hoary cress
- leafy spurge
- perennial sow-thistle
- Russian knapweed
- tartary buckwheat (5.2)(4.9)
- wild buckwheat (4.8)(5.3)

6. **When Used:**

Asparagus: Just before first spears appear. May be repeated at end of cutting season.
Barley, rye, wheat (spring): 3 leaf expanded to just before flag leaf.
Rye (fall), wheat (winter): Early spring, before flag leaf.
Corn: Up to 15 cm tall; 15 - 20 cm tall, use drop nozzles to keep spray off corn.
Flax (Emergency Use Only; MCPA preferred): After 5 cm to early pre-bud.
Oats (Emergency Use Only; MCPA preferred): Up to 3 leaf; 6 leaf to early flag leaf.

7. **How to Apply:**

With: Aircraft or ground equipment.

Rate: Recommendations vary from label to label.

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Asparagus	140 mL	NRF	NRF	NRF	NRF
Barley, rye, wheat	285 - 445 mL	243 - 405 mL	170 - 470 mL	210 - 385 mL	190 - 345 mL
Resistant weeds in cereals	505 - 710** mL	405 - 567 mL	465 - 750** mL	375 - 610** mL	375 - 445** mL
Corn	200 - 445 mL	243 - 324 mL	NRF	285 mL	NRF
Non-crop areas	0.7 - 2.3 L	0.69 - 1.34 L	1.2 - 1.9 L	1.5 L	1.3 - 2.5 L
Pasture, rangeland, turf	0.81 - 1.7 L	0.69 - 1.34 L	0.75 - 2.1 L	0.61 - 1.1 L	0.61 - 1.0 L
Stubble, fallow (fall)	340 - 445 mL	NRF	340 - 445 mL	NRF	NRF
Fallow	0.31 - 1.3 L	NRF	0.5 - 1.3 L	NRF	NRF

* NRF – No Recommendation Found.
** Higher rates can be used if weed infestation is high, but some crop injury may occur.
*** Rates over 607 mL/ac may cause a delay in maturity.

Water volume: Aircraft: 12 L/ac minimum. Ground: Barley, corn, oats, rye, wheat – 40 - 80 L/ac; Flax: 45 - 70 L/ac recommended; Pasture, rangeland, turf: 182 L/ac.

Pressure: Air: 235 kPa or less; Ground 200 - 275 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** Recommendations vary from label to label; **read label** of product used. Do not use on sanfoin, bentgrasses, or freshly seeded grass. Spray during warm weather when the weeds are young and growing actively. At high temperatures, vapourization of more volatile esters may cause injury to susceptible plants.

More resistant weeds

- annual smartweeds (6.5)(5.5)
- common peppergrass
- common purslane
- curled dock
- dog mustard
- field peppergrass
- goat's-beard
- hairy galinsoga
- lady's-thumb
- redroot (-)(6.6) pigweed
- Russian thistle (8.0)(7.5)
- small-seeded false flax
- tansy mustard
- tumble pigweed
- oak-leaved goosefoot
- pineappleweed
- prostrate pigweed

** For the control of fall rosettes in stubble or fallow, apply to emerged weeds prior to freeze-up.

5. **Weeds Suppressed:** Top control or suppression.

- alfalfa
- annual sow-thistle (6.2)
- biennial wormwood
- blue lettuce
- Canada thistle (4.6)(5.4)
- creeping buttercup
- dandelion (3.0)(-)
- field bindweed
- field horsetail
- narrow-leaved hawk's-beard
- gumweed
- hedge bindweed
- hoary cress
- leafy spurge
- perennial sow-thistle
- Russian knapweed
- tartary buckwheat (5.2)(4.9)
- wild buckwheat (4.8)(5.3)

6. **When Used:**

Asparagus: Just before first spears appear. May be repeated at end of cutting season.
Barley, rye, wheat (spring): 3 leaf expanded to just before flag leaf.
Rye (fall), wheat (winter): Early spring, before flag leaf.
Corn: Up to 15 cm tall; 15 - 20 cm tall, use drop nozzles to keep spray off corn.
Flax (Emergency Use Only; MCPA preferred): After 5 cm to early pre-bud.
Oats (Emergency Use Only; MCPA preferred): Up to 3 leaf; 6 leaf to early flag leaf.

7. **How to Apply:**

With: Aircraft or ground equipment.

Rate: Recommendations vary from label to label.

	Formulation and concentration (Quantity/ac)				
Crop	**Amine 500**	**Amine 600**	**Ester 500**	**Ester 600**	**Ester 700**
Asparagus	140 mL	NRF	NRF	NRF	NRF
Barley, rye, wheat	285 - 445 mL	243 - 405 mL	170 - 470 mL	210 - 385 mL	190 - 345 mL
Resistant weeds in cereals	505 - 710** mL	405 - 567 mL	465 - 750** mL	375 - 610** mL	375 - 445** mL
Corn	200 - 445 mL	243 - 324 mL	NRF	285 mL	NRF
Non-crop areas	0.7 - 2.3 L	0.69 - 1.34 L	1.2 - 1.9 L	1.5 L	1.3 - 2.5 L
Pasture, rangeland, turf	0.81 - 1.7 L	0.69 - 1.34 L	0.75 - 2.1 L	0.61 - 1.1 L	0.61 - 1.0 L
Stubble, fallow (fall)	340 - 445 mL	NRF	340 - 445 mL	NRF	NRF
Fallow	0.31 - 1.3 L	NRF	0.5 - 1.3 L	NRF	NRF

* NRF – No Recommendation Found.
** Higher rates can be used if weed infestation is high, but some crop injury may occur.
*** Rates over 607 mL/ac may cause a delay in maturity.

Water volume: Aircraft: 12 L/ac minimum. Ground: Barley, corn, oats, rye, wheat – 40 - 80 L/ac; Flax: 45 - 70 L/ac recommended; Pasture, rangeland, turf: 182 L/ac.

Pressure: Air: 235 kPa or less; Ground 200 - 275 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** Recommendations vary from label to label; **read label** of product used. Do not use on sanfoin, bentgrasses, or freshly seeded grass. Spray during warm weather when the weeds are young and growing actively. At high temperatures, vapourization of more volatile esters may cause injury to susceptible plants.

2,4-D (amine, LV ester)(cont'd)

9. **How it Works:** This hormone-type herbicide causes abnormal growth and affects respiration, food reserves and cell division in broadleafed plants. Absorbed primarily by leaves and stems and translocated to the growing tips and roots.
10. **Expected Results:** Susceptible plants become malformed before they die.
11. **Effects of Rainfall:** A rain-free period of 2 hours for esters, 4 hours for amine and 6 hours for salts is needed after application.
12. **Movement in Soil:** Leaching does not pose a problem.
13. **Grazing and Cropping Restrictions:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut for hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. Tank mixes: Check label of other product for grazing restrictions.
14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (300 - 1,200). Some formulations may cause skin irritation. Some formulations are toxic to fish. May cause burns and can be absorbed through the skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Do not freeze amine; if frozen warm to 4°C and mix thoroughly before using.

2,4-D *(LV ester)*
(Industrial)

[illegible]

Group 4

Manufacturer: **Numerous Manufacturers**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; Low volatile ester; 570 g/L. Estasol LV600: 8 L jug; Esteron 600: 20, 205 L drum; No Weed 2,4-D: 10 L jug; 2,4-D Ester LV600: 20 L pail, 2 x 10 L, 115 L; IPCO LV700: 2 x 10 L, 110 L, 205 L.
2. **Registered Mixes:** bromacil, dicamba, dicamba + dichlorprop, dichlorprop, picloram, sodium TCA.

   Mixing restrictions: Carriers: water, oil. Use only diesel oil No. 1 or No. 2 fuel oil or kerosene where oil is recommended. When using oil carriers, do not allow water to get into product or spray tank. (Oil mixes are very expensive; use may be limited to small areas during the dormant season.) Add 1/3 of the carrier, start agitation, add herbicide, then remainder of the carrier.
3. **Crops:** Industrial and forestry locations. To control unwanted vegetation.
4. **Weeds Controlled:**

   Brush: Alder, birch, cherry, elm, hazelnut, maple (Manitoba), poplar (balsam, trembling aspen), snowberry (western), sumac, willow.

   Weeds: Common broadleaf weeds.
5. **Weeds Suppressed:** Canada thistle, field bindweed.
6. **When Used:**

   Foliar treatment: After foliage is fully developed.

   Stump treatment: On freshly cut stump any time including winter.

   Basal bark treatment: Any time. Do not cut for 1 year after application.

7. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate:

   Aircraft:

   Brush control: 6.6 L in 30 L of spray solution.

   Snowberry, willows: 1.33 L/ac.

   Ground:

   Foliar treatment: 8 L in 1000 L of water; 6.25 L of LV700 in 1000 L of water.

   Stump treatment: 30 L in 1000 L of diesel oil, fuel oil or kerosene; 25 L of LV700 in 1000 L of diesel fuel.

   Basal bark treatment: 20 - 30 L in 1000 L of diesel oil, fuel oil or kerosene; 25 L of LV700 in 1000 L of diesel fuel.

   Frill treatment: 30 L in 1000 L oil.

   Broadleaf weeds: 405 mL/ac - 1.6 L/ac.

   Pressure: Aircraft: 235 kPa or less. Ground: up to 1700 kPa.

8. **Application Tips:** Wet all foliage and stems to point of runoff. Spray during warm weather when weeds and brush are actively growing. Continuous agitation is required for the oil-water mixture. Do not apply by air in dead-calm conditions as the "cloud" of suspended droplets may drift when wind comes up.
9. **How it Works:** Absorbed through leaves and bark in trees. A hormone-type herbicide causing an abnormal growth.
10. **Expected Results:** Brown crisp leaves first appear, then death.
11. **Effects of Rainfall:** A rain-free period of 4 - 6 hours is needed after application.
12. **Movement in Soil:** Minimal soil movement. 30 day half-life.
13. **Grazing and Cropping Restrictions:** Intended for non-crop areas only. Use only on established turf grasses except creeping grasses such as bentgrass.
14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (300 - 1,000). Some formulations may cause skin irritation. Toxic to fish and should not be introduced into aquatic environments.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin,** use standard first aid measures. **If swallowed,** seek medical attention.
16. **Storage:** Store away from fertilizers, seeds, insecticides, fungicides or other herbicides intended for use on 2,4-D sensitive crops. If frozen, bring to room temperature before using.

Edge *(ethalfluralin)*

[illegible] **Group 3**

Manufacturer **Dow AgroSciences Canada Inc.**

1. **Formulations:** Granular; 5%; 25 kg bag and 544 kg returnable bag; Dispersible Concentrate; 60%; water soluble packets; 15 kg case.
2. **Registered Mixes:** None.

   Mixing restrictions: Liquid Fertilizer: Do a compatability test before using. Use a minimum of 45 L/ac.

   Dry fertilizer: apply a minimum of 135 kg/ac in spring or 100 kg/ac in fall.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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Edge (cont'd)

Mixing instructions: Edge DC alone: Vigorous, continuous agitation is essential for proper mixing. Do not pre-slurry. Fill tank 1/3 full with clean water and begin agitation. Add the Edge DC packets directly into the tank. Fill the remainder of the tank. If foaming is a problem, the use of Halt anti-foaming agent is recommended. Continue agitation for at least 5 minutes after filling and maintain throughout operation.

3. **Crops:** Alfalfa (establishment), canola (9.0) (including triazine tolerant), caraway, coriander, dill, fababeans, mustard (yellow) (8.6), peas (9.0), safflower (9.0), soybeans, sunflowers (8.7), dry common beans (white or kidney). Lentils - fall application only.

4. **Weeds Controlled:**

barnyard grass (8.2)
blueweed
chickweed (7.3)
corn spurry
cow cockle
crab grass
fall pancium
giant foxtail
green foxtail (8.5)
kochia (7.0)
lamb's-quarters (8.6)
prostrate pigweed
purslane
redroot pigweed (8.2)
volunteer wheat (7.9)
wild buckwheat (8.3)
wild oats (8.2)
yellow foxtail

5. **Weeds Suppressed:** Barley (volunteer) (6.3), cleavers (6.4), hemp-nettle, lady's-thumb (7.7), nightshade (American, black), thistle (Russian).

6. **When Used:**

Fall: Between September 1 and soil freeze-up.

Spring: Cultivate to destroy weeds; apply prior to seeding crop.

7. **How to Apply:**

With: Ground equipment only.

Rate:

Organic matter	Spring Sand to sandy loam 5% G.**	Spring Loams to clays 5% G.**	Fall Sand to sandy loam 5% G.**	Fall Loams to clays 5% G.**
2 - 4%	6.9 kg/ac	6.9 kg/ac	8.9 kg/ac	8.9 kg/ac
4 - 6%	6.9 kg/ac	8.9 kg/ac	8.9 kg/ac	11.3 kg/ac
6 - 15%	8.9 kg/ac	8.9 - 11.3 kg/ac*	11.3 kg/ac	11.3 kg/ac
	60% D.C.**	**60% D.C.****	**60% D.C.****	**60% D.C.****
2 - 4%	0.57 kg/ac	0.57 kg/ac	0.77 kg/ac	0.77 kg/ac
4 - 6%	0.57kg/ac	0.77 kg/ac	0.77 kg/ac	0.93 kg/ac
6 - 15%	0.77 kg/ac	0.77 - 0.93 kg/ac*	0.93 kg/ac	0.93 kg/ac

* For improved results, use higher rates for fields with high populations of weeds.
** G. - Granular; D.C. – Dispersible Concentrate.

Water volume: 45 L/ac.

Pressure: 275 kPa.

Nozzles: Screens 16 mesh or coarser for the filter on inlet side of pump. Screens 50 mesh or coarser for spraying.

Incorporation: First incorporation must be done within 24 hours of application. Second incorporation should be done at right angles to the first.

Spring application: Apply Edge 5G or Edge 60 DC when the soil is in good working condition. Ensure that the early season flush of weeds are killed by either first or second incorporation. Seed into a weed-free seedbed using accepted cultural practices.

Fall application: It is recommended that both incorporations be completed in the fall. For optimum weed control, prework the field early in the spring to promote germination of weeds and to allow green growth of resistant weeds to develop. Use a 5 - 8 cm deep cultivation with Vibrashank type cultivator or disc prior to seeding to destroy existing green growth. Seed into a weed-free seedbed using accepted cultural practices.

Edge (cont'd)

Mixing instructions: Edge DC alone: Vigorous, continuous agitation is essential for proper mixing. Do not pre-slurry. Fill tank 1/3 full with clean water and begin agitation. Add the Edge DC packets directly into the tank. Fill the remainder of the tank. If foaming is a problem, the use of Halt anti-foaming agent is recommended. Continue agitation for at least 5 minutes after filling and maintain throughout operation.

3. **Crops:** Alfalfa (establishment), canola (9.0) (including triazine tolerant), caraway, coriander, dill, fababeans, mustard (yellow) (8.6), peas (9.0), safflower (9.0), soybeans, sunflowers (8.7), dry common beans (white or kidney). Lentils - fall application only.
4. **Weeds Controlled:**

barnyard grass (8.2)
blueweed
chickweed (7.3)
corn spurry
cow cockle
crab grass
fall pancium
giant foxtail
green foxtail (8.5)
kochia (7.0)
lamb's-quarters (8.6)
prostrate pigweed
purslane
redroot pigweed (8.2)
volunteer wheat (7.9)
wild buckwheat (8.3)
wild oats (8.2)
yellow foxtail

5. **Weeds Suppressed:** Barley (volunteer) (6.3), cleavers (6.4), hemp-nettle, lady's-thumb (7.7), nightshade (American, black), thistle (Russian).
6. **When Used:**

Fall: Between September 1 and soil freeze-up.

Spring: Cultivate to destroy weeds; apply prior to seeding crop.

7. **How to Apply:**

With: Ground equipment only.

Rate:

Organic matter	Spring Sand to sandy loam 5% G.**	Spring Loams to clays 5% G.**	Fall Sand to sandy loam 5% G.**	Fall Loams to clays 5% G.**
2 - 4%	6.9 kg/ac	6.9 kg/ac	8.9 kg/ac	8.9 kg/ac
4 - 6%	6.9 kg/ac	8.9 kg/ac	8.9 kg/ac	11.3 kg/ac
6 - 15%	8.9 kg/ac	8.9 - 11.3 kg/ac*	11.3 kg/ac	11.3 kg/ac
	60% D.C.**	60% D.C.**	60% D.C.**	60% D.C.**
2 - 4%	0.57 kg/ac	0.57 kg/ac	0.77 kg/ac	0.77 kg/ac
4 - 6%	0.57kg/ac	0.77 kg/ac	0.77 kg/ac	0.93 kg/ac
6 - 15%	0.77 kg/ac	0.77 - 0.93 kg/ac*	0.93 kg/ac	0.93 kg/ac

* For improved results, use higher rates for fields with high populations of weeds.

** G. – Granular; D.C. – Dispersible Concentrate.

Water volume: 45 L/ac.

Pressure: 275 kPa.

Nozzles: Screens 16 mesh or coarser for the filter on inlet side of pump. Screens 50 mesh or coarser for spraying.

Incorporation: First incorporation must be done within 24 hours of application. Second incorporation should be done at right angles to the first.

Spring application: Apply Edge 5G or Edge 60 DC when the soil is in good working condition. Ensure that the early season flush of weeds are killed by either first or second incorporation. Seed into a weed-free seedbed using accepted cultural practices.

Fall application: It is recommended that both incorporations be completed in the fall. For optimum weed control, prework the field early in the spring to promote germination of weeds and to allow green growth of resistant weeds to develop. Use a 5 - 8 cm deep cultivation with Vibrashank type cultivator or disc prior to seeding to destroy existing green growth. Seed into a weed-free seedbed using accepted cultural practices.

Edge 5G: Delay second incorporation a **minimum** of 3 days. This allows time for greater release of Edge from the granule into the soil and assures a more uniform distribution.

Implements: A tandem disc, discer, or field (vibrashank) cultivator is recommended. Set to work 8 - 10 cm deep. Disc implements at 7 - 10 km/hr; cultivators at 10 - 13 km/hr. Do not use a field cultivator to incorporate when soil is crusted, lumpy or too wet for good mixing. A tandem disc gives best mixing action on stubble.

8. **Application Tips:** To avoid concentrating wild oat and volunteer cereal seeds below the treated layer, do not plow the land prior to Edge application. Do not apply to fields spread with manure during the past 12 months. Do not apply to soils subject to prolonged periods of flooding or soils in poor working condition. If swath from previous crop has been removed by burning, cultivate once to remove the charcoal layer prior to Edge application. Do not apply Edge DC on soils with more than 20 - 25% straw cover. Chop and thoroughly mix crop residues into the soil prior to the application of Edge DC. Edge 5G can be used where trash is heavier or on standing weeds provided they do not interfere with distribution of the granules and do not limit incorporation. Do not apply on soils with less than 2% organic matter. Application on eroded knolls or Grey Wooded Soils with highly variable texture and organic matter may result in a reduced crop stand, delayed development or reduced yield in either treated crop or rotational crop.

9. **How it Works:** A pre-emergence herbicide that kills seedlings as they germinate. Inhibits cell division in the actively growing points of the root and shoot. Does not control established weeds.

10. **Expected Results:**

    Weeds: Most die before emerging. Weeds will exhibit swelling of the coleoptile region, stubby, thick primary root development and lack of secondary roots. Plants die from lack of ability to obtain moisture.

11. **Effects of Rainfall:** No effect once incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Succeeding crops: Will not harm rotational crops if used as directed. As a precaution, very sensitive crops such as oats, sugar beets or small-seeded grasses such as timothy, canary seed and creeping red fescue should not be grown following an Edge treated crop. Over application caused by overlapping, improper calibration or non-uniform application may reduce stands of crops grown in rotation. Drought conditions in the year of treatment may result in higher than normal levels of Edge in the soil at the end of the growing season. Therefore, to reduce the possibility of injury to rotational crops, seed shallow into a warm, moist seedbed using recommended agronomic practices which willl promote rapid germination and emergence of the rotational crop. Avoid direct seeding (zero till) and seeding into loose seedbeds. Refer to industry or government extension documents which outline seeding practices for each crop. Use good quality certified seed. As an additional safety precaution, seeding rate may be increased slightly (10%). As a precaution, do not seed wheat as a rotational crop on land that has received ethalfluralin or trifluralin at oilseed/special crop/barley rate for two consecutive years.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (technical) greater than 5,000. Direct contamination of any body of water may kill fish.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in areas not exposed to high temperatures or prolonged direct sunlight. Do not let Edge 5G remain in standing applicator under these conditions.

Edge (cont'd)

17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Trifluralin 10G, Heritage, Trifluralin 400, Rival and Fortress) will not control trifluralin tolerant Green foxtail. To delay selection or reduce the spread of trifluralin tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin tolerant green foxtail.

Embutox 625/Caliber 400/ SEE 2,4-DB/Cobutox 600

(2,4-DB)

[illegible] **Group 4**

Manufacturer: **Nufarm/United Agri Products/IPCO**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; Caliber 400; 400 g/L, 10 L Cobutox 600; 600 g/L; 10 L container. Embutox 625; 625 g/L; 10 L jug. SEE 2,4-DB; 480 g/L, 10 L containers.
2. **Registered Mixes:** Avenge (refer to Avenge label for details), MCPA amine, Embutox 625: MCPA Na-salt (300 g ai/L), MCPA K-salt (400 g ai/L).
3. **Crops:**

alsike clover (8.9)
alsike white (8.9)
barley (9.0)
field corn
oats (8.2)
pastures (9.0)
seedling alfalfa (8.0)
seedling bird's-foot trefoil
seedling grasses for forage
spring wheat (8.8)

4. **Weeds Controlled:**

ball mustard (5.8)
bull thistle
chicory
curled dock (8.0)
lamb's-quarters (8.5)
narrow-leaved hawk's-beard*
oak-leaved goose-foot
plantain
ragweed
redroot pigweed (7.5)
shepherd's-purse (6.5)
stinkweed
wild buckwheat (5.7)
wild mustard (5.8)**
wormseed mustard (5.8)
yellow rocket

* Fall application for legumes.
** For better control tank mix with MCPA.

5. **Weeds Suppressed:**

Canada thistle (5.4)
field bindweed
dandelion
green smartweeds (5.4)
horsetail
lady's-thumb
perennial sow-thistle (5.4)

6. **When Used:**

Weeds: 1 - 3 leaf (seedling) stage.

Narrow-leaved hawk's-beard: Rosette stage in late fall after alfalfa has become dormant but weeds are still growing.

Legumes: Seedling alfalfa, bird's-foot trefoil: 1 - 4 trifoliate leaf. Seedling white, alsike clover: after the first trifoliate leaf.

Cereals: 5th leaf to early flag leaf.

Field corn: After crop is 38 cm high but before the beginning of tasselling.

Pastures: After cutting or grazing and before regrowth is 7.5 cm tall.

7. **How to Apply:**

With: Ground equipment.

Rate:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alfalfa, bird's-foot trefoil, grasses (seedling; direct or underseeded)	0.7 - 0.9	0.7 - 0.9	1.1 - 1.4	0.9
Barley, oats, wheat	0.7 - 0.9	0.7 - 0.9	1.1 - 1.4	0.9
Clovers (seedling; direct or underseeded)	0.7 - 0.9	0.7 - 0.9	1.1 - 1.4	0.9
Corn (field)	0.7 - 0.9	0.7 - 0.9	1.1 - 1.7	1.5
Pasture (containing legumes)	0.7 - 1.1	0.7 - 1.1	1.1 - 1.7	1.5
Perennial weeds	0.9 - 1.1	0.9 - 1.1	1.1 - 1.7	1.5
Dandelion, horsetail, smartweeds*	1.1	1.1	1.7	1.5

* Seedlings only stunted.

Use 500 mL/ac Embutox 625 tank mixed with 47 mL/ac MCPA Na-salt or 36 mL/ac MCPA K-salt for improved wild mustard control beyond the 4 leaf stage. Refer to other formulation labels for tank mixes for wild mustard control.

Water volume: 60 - 80 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** Damage to forage legumes (especially to established alfalfa) may occur and increase in severity the longer treatment is delayed beyond stage recommended. Do not spray in drought conditions. Oats are sensitive if treated before the 5 leaf stage. For better wild mustard control, tank mix with MCPA amine for use on seedling alfalfa and bird's-foot trefoil – some crop stunting may occur. Use low rate when tank mixing with MCPA (see product label).
9. **How it Works:** Susceptible plants convert 2,4-DB to 2,4-D. Certain legumes do not convert it. 2,4-DB is translocated to actively growing parts.
10. **Expected Results:** Weeds should die within 2 - 3 weeks of treatment. Smartweeds seedlings only stunted.
11. **Effects of Rainfall:** Rainfall before the foliage has dried from the spraying may decrease activity.
12. **Movement in Soil:** Leaching does not pose a problem.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest for livestock feed in the year of treatment.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,960). Toxic to fish. Non-toxic to birds and bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage is not required. If frozen, warm to 20 - 22°C and agitate thoroughly.

7. **How to Apply:**

With: Ground equipment.

Rate:

Crop	Embutox 625 (L/ac)	Cobutox 600 (L/ac)	Caliber 400 (L/ac)	SEE 2,4-DB (L/ac)
Alfalfa, bird's-foot trefoil, grasses (seedling; direct or underseeded)	0.7 - 0.9	0.7 - 0.9	1.1 - 1.4	0.9
Barley, oats, wheat	0.7 - 0.9	0.7 - 0.9	1.1 - 1.4	0.9
Clovers (seedling; direct or underseeded)	0.7 - 0.9	0.7 - 0.9	1.1 - 1.4	0.9
Corn (field)	0.7 - 0.9	0.7 - 0.9	1.1 - 1.7	1.5
Pasture (containing legumes)	0.7 - 1.1	0.7 - 1.1	1.1 - 1.7	1.5
Perennial weeds	0.9 - 1.1	0.9 - 1.1	1.1 - 1.7	1.5
Dandelion, horsetail, smartweeds*	1.1	1.1	1.7	1.5

* Seedlings only stunted.

Use 500 mL/ac Embutox 625 tank mixed with 47 mL/ac MCPA Na-salt or 36 mL/ac MCPA K-salt for improved wild mustard control beyond the 4 leaf stage. Refer to other formulation labels for tank mixes for wild mustard control.

Water volume: 60 - 80 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** Damage to forage legumes (especially to established alfalfa) may occur and increase in severity the longer treatment is delayed beyond stage recommended. Do not spray in drought conditions. Oats are sensitive if treated before the 5 leaf stage. For better wild mustard control, tank mix with MCPA amine for use on seedling alfalfa and bird's-foot trefoil – some crop stunting may occur. Use low rate when tank mixing with MCPA (see product label).
9. **How it Works:** Susceptible plants convert 2,4-DB to 2,4-D. Certain legumes do not convert it. 2,4-DB is translocated to actively growing parts.
10. **Expected Results:** Weeds should die within 2 - 3 weeks of treatment. Smartweeds seedlings only stunted.
11. **Effects of Rainfall:** Rainfall before the foliage has dried from the spraying may decrease activity.
12. **Movement in Soil:** Leaching does not pose a problem.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest for livestock feed in the year of treatment.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,960). Toxic to fish. Non-toxic to birds and bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage is not required. If frozen, warm to 20 - 22°C and agitate thoroughly.

Eptam *(EPTC)*

Group 8

Manufacturer **Zeneca Agro**

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; Eptam 8-E; 800 g/L; 10 L can.
2. **Registered Mixes:** Treflan and Rival [beans (dry common white and red kidney) only], Eptam 8-E + Lexone or Sencor (Irish potatoes), liquid or granular fertilizers (except nitrate based), Rival, Treflan.

   Mixing restrictions: Check fertilizer compatibility before tank mixing.
3. **Crops:** Alfalfa (7.7), bird's-foot trefoil, cicer milk vetch, dry beans (7.8), snap beans (8.7), flax (7.5), Irish potatoes (8.8), sunflowers (7.8), turnips (rutabagas) (8.0), sugar beets (8.3), sweet clover.

   Underseeding: Not recommended.
4. **Weeds Controlled:**

   annual bluegrass (7.2)
   barnyard grass (8.6)*
   common chickweed
   corn spurry (9.0)
   green foxtail (7.7)*
   hairy nightshade (6.3)
   henbit
   Italian ryegrass (8.4)
   lamb's-quarters (6.4)*
   prostrate pigweed*
   purslane
   quackgrass
   redroot pigweed (6.3)*
   tumble pigweed*
   volunteer barley (7.0)
   volunteer oats
   volunteer wheat (7.9)
   wild oats (8.1)

   * In dry beans, improved control can be obtained by tank mixing with Treflan or Rival.
5. **Weeds Suppressed:** None.
6. **When Used:**

   Alfalfa, bird's-foot trefoil (seedings), cicer milk vetch, sweet clover – Pre-planting: Do not use if seeding a grain or grass nurse crop.
   Beans, snap or dry (including red kidney) – Pre-planting: Do not use on cow peas, or Adzuki, soy, lima or other flat podded beans except Romano.
   Flax, sunflower – Spring – Pre-planting: Do not apply in spring to soils with less than 3% organic matter.
   Fall – Before freeze-up: Cultivate lightly to destroy any overwintering rosettes in spring, before seeding.
   Potatoes: Incorporate in the fall or spring, after pre-emergence cultivation or before the last cultivation.
   Eptam 8-E can also be metered into sprinkler irrigation equipment (**read label** for instructions).
   Turnips: Apply and incorporate 6 - 10 days before planting.
   Sugar Beets: In sprinkler irrigation water.

   Note: Fall application should not be used in areas where soil drifting is a hazard.
7. **How to Apply:**

   With: Ground equipment or irrigation water.

   Rate:

Crop	Eptam 8-E L/ac	Crop	Eptam 8-E L/ac
Alfalfa, bird's-foot trefoil, cicer milk vetch, sweet clover	1.7	Potatoes (pre-plant, pre-emergent)	1.7 - 3.4
Beans (dry, snap)	1.7 - 2.2	Potatoes (post-emergent)	1.7 - 2.2
(See exceptions in *When Used*)		Potatoes (sprinkler)	1.7 - 2.2
Flax (spring; sandy soil)	1.4	Potatoes (fall)	2.2 - 3.4
Flax (spring; clay soil)	1.7	Sugar baets (sprinklers)	1.1 - 1.7
Flax (fall; sandy soil)	1.7	Sunflowers (spring)	1.7
Flax (fall; clay soil)	2.2	Sunflowers (fall)	1.7 - 2.2
(Do not use on Flax south of Highway 1 in Alberta)		Turnips (sandy soil)	1.3
		Turnips (clay soil)	1.7

Eptam *(EPTC)*

[illegible] Group 8

Manufacturer: Zeneca Agro

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; Eptam 8-E; 800 g/L; 10 L can.
2. **Registered Mixes:** Treflan and Rival [beans (dry common white and red kidney) only], Eptam 8-E + Lexone or Sencor (Irish potatoes), liquid or granular fertilizers (except nitrate based), Rival, Treflan.

   Mixing restrictions: Check fertilizer compatibility before tank mixing.
3. **Crops:** Alfalfa (7.7), bird's-foot trefoil, cicer milk vetch, dry beans (7.8), snap beans (8.7), flax (7.5), Irish potatoes (8.8), sunflowers (7.8), turnips (rutabagas) (8.0), sugar beets (8.3), sweet clover.

   Underseeding: Not recommended.
4. **Weeds Controlled:**

   annual bluegrass (7.2)
   barnyard grass (8.6)*
   common chickweed
   corn spurry (9.0)
   green foxtail (7.7)*
   hairy nightshade (6.3)
   henbit
   Italian ryegrass (8.4)
   lamb's-quarters (6.4)*
   prostrate pigweed*
   purslane
   quackgrass
   redroot pigweed (6.3)*
   tumble pigweed*
   volunteer barley (7.0)
   volunteer oats
   volunteer wheat (7.9)
   wild oats (8.1)

   * In dry beans, improved control can be obtained by tank mixing with Treflan or Rival.
5. **Weeds Suppressed:** None.
6. **When Used:**

   Alfalfa, bird's-foot trefoil (seedings), cicer milk vetch, sweet clover – Pre-planting: Do not use if seeding a grain or grass nurse crop.
   Beans, snap or dry (including red kidney) – Pre-planting: Do not use on cow peas, or Adzuki, soy, lima or other flat podded beans except Romano.
   Flax, sunflower – Spring – Pre-planting: Do not apply in spring to soils with less than 3% organic matter.
   Fall – Before freeze-up: Cultivate lightly to destroy any overwintering rosettes in spring, before seeding.
   Potatoes: Incorporate in the fall or spring, after pre-emergence cultivation or before the last cultivation.
   Eptam 8-E can also be metered into sprinkler irrigation equipment (**read label** for instructions).
   Turnips: Apply and incorporate 6 - 10 days before planting.
   Sugar Beets: In sprinkler irrigation water.

   Note: Fall application should not be used in areas where soil drifting is a hazard.
7. **How to Apply:**

   With: Ground equipment or irrigation water.

   Rate:

[illegible]	[illegible]	[illegible]	[illegible]
Alfalfa, bird's-foot trefoil, cicer milk vetch, sweet clover	**1.7**	**Potatoes (pre-plant, pre-emergent)**	**1.7 - 3.4**
Beans (dry, snap)	**1.7 - 2.2**	**Potatoes (post-emergent)**	**1.7 - 2.2**
(See exceptions in *When Used*)		**Potatoes (sprinkler)**	**1.7 - 2.2**
Flax (spring; sandy soil)	**1.4**	**Potatoes (fall)**	**2.2 - 3.4**
Flax (spring; clay soil)	**1.7**	**Sugar beets (sprinklers)**	**1.1 - 1.7**
Flax (fall; sandy soil)	**1.7**	**Sunflowers (spring)**	**1.7**
Flax (fall; clay soil)	**2.2**	**Sunflowers (fall)**	**1.7 - 2.2**
(Do not use on Flax south of Highway 1 in Alberta)		**Turnips (sandy soil)**	**1.3**
		Turnips (clay soil)	**1.7**

Beans [dry common (white and red kidney)], Eptam 8-E + Treflan 545EC or Rival 500EC, 1.2 L/ac + 445 mL/ac or 486 mL/ac.

Water volume: 45 L/ac minimum.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: Incorporate immediately. Second incorporation must be at right angles to the first. Power-driven cultivation equipment, set to cut 5 - 7.5 cm deep. Tandem, one way discs, set to cut 10 - 15 cm and operate at 6.5 - 9.5 km/h followed by harrows. Field cultivators, for lighter soils in good tilth. Use 3 - 4 rows of sweeps spaced no wider than 18 cm. Cut 10 - 15 cm deep at 9.5 km/h. Pull a levelling device (such as harrows) behind incorporating equipment.

8. **Application Tips:** For use on mineral soils only. When applying Eptam 8-E with granular fertilizer, a minimum of 81 kg/ac and a maximum of 324 kg/ac of fertilizer is required. See product label for further instructions.

   Flax, special instructions: Seed shallow, less than 3 cm, into a firm seedbed. Deep seeding reduces stands.

9. **How it Works:** Taken up by the roots and shoots of a germinating weed where it disrupts and stops further growth.

10. **Expected Results:**

    Weeds: Absorbed by the weed shoot, therefore, most affected weeds will not emerge. Numerous chlorotic and bleached shoots may be visible by removing the top few inches of treated soil. Provides effective weed control for approximately 6 - 8 weeks.

    Crops: If crop seedlings are weak, some injury may occur.

11. **Effects of Rainfall:** Very soluble in water so excessive moisture may cause leaching (usually not a problem in Alberta).

12. **Movement in Soil:** Eptam will move readily in the soil.

13. **Grazing and Cropping Restrictions:** Do not graze or harvest for livestock feed in year of treatment.

    Harvest restriction: Pre-harvest interval (days) after treatment – potatoes (45).

    Succeeding crops: No restrictions.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,600). Very toxic to fish. Non-toxic to birds.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Heated storage not required. Store away from seed and fertilizer.

Eradicane 8-E *(EPTC)*

[illegible] Group 8

Manufacturer: Zeneca Agro

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; 800 g/L; 10 L jug.

2. **Registered Mixes:** Atrazine (80W or F), liquid fertilizer, granular fertilizer, urea and urea blends.

   Mixing restrictions: Check fertilizer compatability before tank mixing.

3. **Crops:** Corn (field, sweet) (9.0).

Eradicane 8-E (cont'd)

4. **Weeds Controlled:**

annual bluegrass
barnyard grass (8.6)
common chickweed
corn spurry
green foxtail (7.7)
hairy nightshade (6.3)
henbit
Italian ryegrass
lamb's-quarters (6.4)
prostrate pigweed
purslane
quackgrass
redroot pigweed (6.3)
tumble pigweed
volunteer barley (7.0)
volunteer oats
volunteer wheat (7.9)
wild oats (8.1)
yellow foxtail

5. **Weeds Suppressed:** None.

6. **When Used:** Apply, incorporate and seed corn as soon as possible.

7. **How to Apply:**

With: Ground equipment.

Rate:

Crop	L/ac
Corn (field, silage)	1.7 - 3.4
Corn (sweet)	1.7 - 2.2
Sandy soils	1.7
Clay soils	2.2
Annual weed control	2.2 (maximum)
Quackgrass control	3.4

Water volume: 45 L/ac minimum

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: Within minutes of application. Use power-driven cultivation equipment, set to cut 5 - 7.5 cm deep or discs set 10 - 15 cm – both these types of equipment should operate at 6.5 - 9.5 km/h. A second working at right angles to the first will provide adequate mixing. Pull a levelling device (such as harrows) behind incorporating equipment.

8. **Application Tips:** Proper soil coverage and immediate and adequate soil mixing are important.

9. **How it Works:** Absorbed by roots and shoots of a germinating weed, disrupts and stops growth and causes eventual death.

10. **Expected Results:**

Weeds: Affected weeds do not emerge, chlorotic and bleached shoots are visible by removing a layer of treated soil.

Crops: Weak seedlings may be injured. **Poor results may be expected if** soils are wet, cloddy and trashy or not suitable for proper application or incorporation.

11. **Effects of Rainfall:** Very soluble therefore, excessive moisture may cause leaching (usually not a problem in Alberta).

12. **Movement in Soil:** Will move readily.

13. **Grazing and Cropping Restrictions:** No restrictions on grazing, crop use after hail or on succeeding crops. Danger from drift is low.

Caution: Excessive incorporation required may cause erosion on some soil.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,600).

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page for 21 further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Heated storage not required.

Eradicane 8-E (cont'd)

4. **Weeds Controlled:**

annual bluegrass
barnyard grass (8.6)
common chickweed
corn spurry
green foxtail (7.7)
hairy nightshade (6.3)
henbit
Italian ryegrass
lamb's-quarters (6.4)
prostrate pigweed
purslane
quackgrass
redroot pigweed (6.3)
tumble pigweed
volunteer barley (7.0)
volunteer oats
volunteer wheat (7.9)
wild oats (8.1)
yellow foxtail

5. **Weeds Suppressed:** None.

6. **When Used:** Apply, incorporate and seed corn as soon as possible.

7. **How to Apply:**

With: Ground equipment.

Rate:

Corn (field, silage)	1.7 - 3.4
Corn (sweet)	1.7 - 2.2
Sandy soils	1.7
Clay soils	2.2
Annual weed control	2.2 (maximum)
Quackgrass control	3.4

Water volume: 45 L/ac minimum

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: Within minutes of application. Use power-driven cultivation equipment, set to cut 5 - 7.5 cm deep or discs set 10 - 15 cm – both these types of equipment should operate at 6.5 - 9.5 km/h. A second working at right angles to the first will provide adequate mixing. Pull a levelling device (such as harrows) behind incorporating equipment.

8. **Application Tips:** Proper soil coverage and immediate and adequate soil mixing are important.

9. **How it Works:** Absorbed by roots and shoots of a germinating weed, disrupts and stops growth and causes eventual death.

10. **Expected Results:**

Weeds: Affected weeds do not emerge, chlorotic and bleached shoots are visible by removing a layer of treated soil.

Crops: Weak seedlings may be injured. **Poor results may be expected if** soils are wet, cloddy and trashy or not suitable for proper application or incorporation.

11. **Effects of Rainfall:** Very soluble therefore, excessive moisture may cause leaching (usually not a problem in Alberta).

12. **Movement in Soil:** Will move readily.

13. **Grazing and Cropping Restrictions:** No restrictions on grazing, crop use after hail or on succeeding crops. Danger from drift is low.

Caution: Excessive incorporation required may cause erosion on some soil.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,600).

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page for 21 further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Heated storage not required.

Escort *(metsulfuron methyl)*

Group 2

Manufacturer: **DuPont Canada Inc.**

1. **Formulations:** Dry flowable; 60%; 250 g container.
2. **Registered Mixes:** 2,4-D ester or amine.

   Surfactants: Escort must be used with a recommended surfactant such as Agsurf, Agral 90, or Citowett Plus.

   Mixing instructions: Add 1/2 - 3/4 required amount of water. While agitating, add Escort and ensure it is completely suspended. If mixing with 2,4-D, add 2,4-D after the Escort is in suspension. Complete filling, then add surfactant. Continuous agitation is required. Antifoaming agent may be needed.
3. **Crops:** Pasture, rangeland, rough turf and non-crop areas.
4. **Weeds Controlled:**
   Common tansy, kochia, scentless chamomile, sweet clover, Russian thistle: 8 g/ac.
   Western snowberry plus above weeds: 10 g/ac.
   Wild rose, dandelion plus above weeds: 12 g/ac.
5. **Weeds Suppressed:** Canada thistle, sow-thistle.
6. **When Used:**

   Brush: Mid-June to mid-August after weed species have leafed out but before fall coloration begins.

   Weeds: Best results when applied to young and actively growing weeds.
7. **How to Apply:**

   With: Ground equipment. Do **not** apply by air.

   Rate: 8 - 12 g/ac depending on weed species.

   Surfactant: 2 L/1000 L spray solution.

   Water volume: 40 - 90 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat Fan types. 50 mesh or larger screens. Only metal or nylon filters.

   Sprayer clean-up: To avoid injury to susceptible crops, clean sprayer thoroughly immediately after spraying.
   1. Drain tank; then flush tank, boom and hoses with clean water for a minimum of 10 minutes. Visually inspect tank to assure removal of all visible residues of Escort. If necessary, repeat step 1.
   2. Fill the tank with clean water and add one litre of household ammonia (containing a minimum of 3% ammonia) per 100 litres of water. Fill boom and hoses with solution and allow sprayer to sit for 15 minutes. Drain.
   3. Remove the nozzles and screens, and clean separately in a bucket containing cleaning agent and water.
   4. Repeat step 2.
   5. Nozzles and screens should be removed and cleaned separately. To remove traces of ammonia, rinse the tank, hoses and booms thoroughly with clean water.
8. **Application Tips:** Apply as a full coverage spray to foliage and stems using equipment that will assure uniform coverage. Use spray preparation within 48 hours or product degradation may occur. If spray preparation is left standing without agitation, thoroughly agitate before spraying. Avoid overspray or drift to important wildlife habitats such as shelterbelts, wetlands, sloughs, and dry slough borders, woodlots, vegetated ditchbanks and other cover on the edge of fields. Leave a 50 metre buffer zone between the last spray swath and the edge of any of these habitats.
9. **How it Works:** Absorbed by foliage. Inhibits cell elongation.

Escort (cont'd)

10. **Expected Results:** Escort rapidly stops growth of susceptible species; however, typical symptoms (discoloration) may not be noticeable for several weeks after application, depending on growing conditions and weed susceptibility. Warm, moist conditions following treatment promote the activity of Escort while cold, dry conditions may reduce or delay activity. Brush hardened off by cold weather or drought stress may not be controlled.
11. **Effects of Rainfall:** Rainfall within 2 hours of application may lessen the degree of weed control.
12. **Movement in Soil:** Movement of Escort is restricted by fine-textured soils, soil organic matter and neutral to acidic conditions.
13. **Grazing and Cropping Restrictions:** The treated area may be grazed on the day of treatment.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000).
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition,, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place. Non-corrosive, non-flammable, non-volatile and does not freeze.
17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Escort, Express, Muster, Refine Extra, the DF component of Laser DF, the Plus component of Triumph Plus and Telar. To delay selection of resistant populations, rotate the use of Ally, Amber, Escort, Express, Laser DF, Muster, Refine Extra, Telar and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Estaprop/Turboprop 600/ SEE Diphenoprop/ Dichlorprop-D/Interprop

(2,4-D + dichlorprop)

Group 4

Manufacturer: **Nufarm/United Agri Products/IPCO/Aventis Crop Science**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; 282 g/L 2,4-D ester isomer specific + 300 g/L dichlorprop; Dichlorprop-D, 10 L; Estaprop; 10 L, 114 L container; Turboprop 600; 10 L, 115 L containers; SEE Diphenoprop; Solventless Concentrate; 222 g/L 2,4-D + 222 g/L dichlorprop; 10 L.
2. **Registered Mixes**: Assert, Avenge (barley, Avenge wheat varieties), Achieve 80DG, Puma.

   Mixing instructions: Add 2,4-D + dichlorprop. Agitate. Add Avenge. Refer to Achieve 80DG write-up for mixing instructions. Puma: add Estaprop, then add Puma.
3. **Crops:** Barley (8.1), wheat [spring (8.2), winter (8.9)].

   Underseeding: Legumes not recommended.

4. **Weeds Controlled:**

annual sow-thistle (7.6)
ball mustard
bluebur (9.0)
burdock
cocklebur
dog mustard
flixweed (7.6)
hare's-ear mustard
Indian mustard
kochia (8.1)
lady's-thumb
lamb's-quarters (8.4)
night-flowering catchfly
oak-leaved goosefoot
ragweeds
redroot pigweed (7.9)
round-leaved mallow (6.9)
Russian pigweed
Russian thistle (8.1)
shepherd's-purse (7.8)
smartweeds (6.9)
stinkweed (8.4)
stork's-bill (7.3)
tartary buckwheat (8.2)
tumble mustard
volunteer rapeseed
volunteer sunflower
wild buckwheat (6.8)
wild mustard (8.6)
wormseed mustard

5. **Weeds Suppressed:** sow-thistle (perennial), thistle [Canada (5.6)], curled dock, toadflax, **mallow (round-leaved) (Turboprop, See Diphenoprop).

6. **When Used:** Spring seeded crops: 4 leaf to early flag leaf. Fall seeded crops: full tillering to flag leaf, apply only in spring. Early spraying of stork's-bill, round-leaved mallow and kochia gives good control.

7. **How to Apply:**

With: Ground or air equipment.

Rate: 710 mL/ac.

Water volume: 20 - 80 L/ac. Air: 12 L/ac.

Pressure: 275 kPa. Air: 235 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** Crops under stress from adverse environmental conditions such as excess moisture, drought, or disease may suffer a further setback when Estaprop or Turboprop is applied; however, the crop injury that may occur is usually offset by weed control obtained.

9. **How it Works:** A systemic herbicide absorbed by leaf and stem.

10. **Expected Results:** Twisting and curling of weeds will commence 2 - 10 days after application. Growth ceases, eventually plants turn brown and die. **Poor results may be expected if** poor coverage or low relative humidity during and after spraying.

11. **Effects of Rainfall:** Rain within 3 or 4 hours of application may reduce control.

12. **Movement in Soil:** Leaching does not pose a problem.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop until 40 days after treatment.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 2,4-D (300 - 1,000), dichlorprop (800). Do not spray on foraging bees. Toxic to bees. May be absorbed through the skin and may cause burns.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** May be stored at any temperature. Shake well after storing for 1 year or longer.

** Toadflax: Apply when the majority of the toadflax are no taller than 15 cm. The degree of suppression will vary with the size of toadflax and environmental conditions prior to and following treatment. Use of Estaprop or Turboprop for suppression of toadflax in wheat or barley is part of a long-term planned approach for toadflax control. Do not apply before the 4 leaf stage or between flag leaf to full-headed stages.

Note: This is a minor use registration and may or may not appear on the current product label.

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Estaprop/Turboprop 600/ Dichlorprop-D *(2,4-D + dichlorprop)*

(Industrial)

Group 4

Manufacturer: Nufarm/United Agri Products/IPCO

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; Estaprop/Turboprop 600/Dichlorprop-D, 282 g/L 2,4-D ester isomer specific + 300 g/L dichlorprop; Estaprop, 10 L, 114 L container; Turboprop 600, 10 L, 115 L, 400 L containers; Dichlorprop-D, 10 L.
2. **Registered Mixes:** DyCleer, fuel oil (basal, frill, stump), TCA (spruce, balsam, pine).

   Mixing instructions: Add 1/2 amount of carrier, start agitation, add herbicide, then add rest of carrier. In water, agitate to prevent separation. In oil, do not let water get into mixture.
3. **Crops:** Non-crop areas, industrial areas, rights of way, roadsides.

   Underseeding: Not applicable.
4. **Weeds Controlled:**

   Brush:

[illegible]	[illegible]		
hawthorn	alder	hardhack	Scotch pine
poplar	aspen	hazel	silver maple
Scotch pine	balsam fir	hickory	sumac
sugar maple	basswood	honeysuckle	tamarack
wild cherry	birch	ground juniper	tame raspberry
wild plum	blueberry	Manitoba maple	white oak
wild raspberry	bur oak	poison-ivy	wild apple
white cedar	elderberry	red pine	willow
	elm		

[illegible]			
alfalfa	cinquefoil	hawkweed	tansy
bull thistle	curled dock	horsetail	teasel
burdock	dandelion	mullein	vetch
buttercup	dogbane	perennial sow-thistle	wild carrot
Canada thistle	goat's-beard	plantain	yellow rocket
chicory	goldenrod	sweet clover	

5. **Weeds Suppressed:** Milkweed, toadflax.
6. **When Used:**

   Brush control: Apply on foliage and stems just prior to or just after brush is in full leaf in late spring or early fall. Many species may require retreatment the following year.

   Basal treatment (not ash or basswood): Any time of year.

   Frill treatment: Standing trees more than 13 - 15 cm in diameter.

   Stump treatment: Immediately after cutting.

   Weeds: During May or in early fall. Some species may require a second treatment.

Estaprop/Turboprop 600/ Dichlorprop-D *(2,4-D + dichlorprop)*

(Industrial)

[illegible] **Group 4**

Manufacturer **Nufarm/United Agri Products/IPCO**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; Estaprop/Turboprop 600/Dichlorprop-D, 282 g/L 2,4-D ester isomer specific + 300 g/L dichlorprop; Estaprop, 10 L, 114 L container; Turboprop 600, 10 L, 115 L, 400 L containers; Dichlorprop-D, 10 L.
2. **Registered Mixes:** DyCleer, fuel oil (basal, frill, stump), TCA (spruce, balsam, pine).

   Mixing instructions: Add 1/2 amount of carrier, start agitation, add herbicide, then add rest of carrier. In water, agitate to prevent separation. In oil, do not let water get into mixture.
3. **Crops:** Non-crop areas, industrial areas, rights of way, roadsides.

   Underseeding: Not applicable.
4. **Weeds Controlled:**

   Brush:

Group 1

hawthorn
poplar
Scotch pine
sugar maple
wild cherry
wild plum
wild raspberry
white cedar

Group 2

alder
aspen
balsam fir
basswood
birch
blueberry
bur oak
elderberry
elm
hardhack
hazel
hickory
honeysuckle
ground juniper
Manitoba maple
poison-ivy
red pine
Scotch pine
silver maple
sumac
tamarack
tame raspberry
white oak
wild apple
willow

Weeds (also weeds listed for Estaprop, Turboprop 600)

alfalfa
bull thistle
burdock
buttercup
Canada thistle
chicory
cinquefoil
curled dock
dandelion
dogbane
goat's-beard
goldenrod
hawkweed
horsetail
mullein
perennial sow-thistle
plantain
sweet clover
tansy
teasel
vetch
wild carrot
yellow rocket

5. **Weeds Suppressed:** Milkweed, toadflax.
6. **When Used:**

   Brush control: Apply on foliage and stems just prior to or just after brush is in full leaf in late spring or early fall. Many species may require retreatment the following year.

   Basal treatment (not ash or basswood): Any time of year.

   Frill treatment: Standing trees more than 13 - 15 cm in diameter.

   Stump treatment: Immediately after cutting.

   Weeds: During May or in early fall. Some species may require a second treatment.

7. **How to Apply:**

   With: Power equipment, knapsack sprayer, air.

   Rate:

   Brush control (rate/1000 L of water): Group 1 (see Weeds Controlled): Estaprop/Dichlorprop-D, 8.75 L; Turboprop 8.0 L. Group 2: Estaprop/Dichlorprop-D, 11.7 L; Turboprop, 11.0 L.

   Basal (not ash or basswood)(rate/100 L of fuel oil): Group 1: Estaprop/Dichlorprop-D, 3.25 L; Turboprop, 2.4 L. Group 2: Estaprop/Dichlorprop-D, 5.1 L; Turboprop 3.2 L.

   Frill/stump treatment (rate/100 L fuel oil): Estaprop/Dichlorprop-D, 3.25 L; Turboprop, 3.2 L.

   Weeds: Estaprop/Turboprop/Dichlorprop-D, 1.6 L/ac.

   Water volume:

   Ground: Brush Control 305 - 610 L/ac depending on brush density and height. Weeds 80 - 240 L/ac, spray to point of runoff.

   Pressure: As recommended for equipment used.

   Nozzles: Flat fan recommended.

8. **Application Tips:** Thoroughly wet down all foliage and stems to ground level. Do not spray during high winds or high temperatures.
9. **How it Works:** A translocated, systemic herbicide absorbed by leaves.
10. **Expected Results:** Leaves brown and wilt shortly after spraying – no leaves appear the following year.
11. **Effects of Rainfall:** Rain within 3 or 4 hours after application may reduce control.
12. **Movement in Soil:** Leaching does not pose a problem.
13. **Grazing and Cropping Restrictions:** No grazing restrictions specified.

    Drift: Over susceptible crops causes injury.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 2,4-D (300 - 1,000); dichlorprop (800). Do not apply when bees are foraging. Toxic to bees. May be absorbed through the skin and may cause burns.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** If frozen, warm to 5°C and mix well.

    Note: Similar product is Diphenoprop 700.

Express Pack *(tribenuron methyl)*

Group 2

DuPont Canada Inc

CAUTION POISON

1. **Formulations:** Dry flowable, 75%, 160 g container Express packaged with 10L jug 2,4-D Ester LV 700.
2. **Registered Mixes:** **Express herbicide must be tank mixed with 2,4-D. Do not use Express alone.** 2,4-D ester LV 700 (240 mL/ac - 323 mL/ac), Assert.

   Mixing instructions: Add 1/3 required amount of water. While agitating, add Express and ensure it is completely suspended. Add 2,4-D ester. Complete filling. Antifoaming agents may be required. For repeat tank loads, reduce remaining mixture to 10% of original spray volumes or pre-slurry Express.

Express Pack (cont'd)

3. **Crops:** Wheat (spring, durum), barley, summerfallow.

   Underseeding: Do not apply to wheat and barley underseeded to legumes or grasses.

4. **Weeds Controlled:** Express and 2,4-D ester.

   annual sunflower
   ball mustard (8.6)
   cow cockle (8.9)
   flixweed
   hare's-ear mustard (8.6)
   Indian mustard (8.6)
   kochia (2 - 10 leaf)(8.1)
   lamb's-quarters (8.2)
   narrow-leaved hawk's-beard
   prickly lettuce
   redroot pigweed (8.6)
   Russian pigweed
   Russian thistle (8.5)
   shepherd's-purse
   stinkweed (8.9)
   sweet clover
   thyme-leaved spurge
   tumble mustard (8.6)
   wild mustard (8.6)
   wild radish
   wormseed mustard (8.6)

5. **Weeds Suppressed:** Canada thistle [top growth control (6.9)], wild buckwheat [1 - 3 leaf (8.1)].

6. **When Used:** Wheat (spring, durum), barley: 3 leaf expanded to just before the flag leaf stage (shot blade). Do not apply after the head has emerged. **Summerfallow** (control of fall rosettes and spring seedlings of shepherd's-purse, narrow-leaved hawk's-beard, flixweed and stinkweed): Apply the tank mix in the spring after emergence, up to the early flowering stage. Only weeds that have emerged at time of application will be controlled.

7. **How to Apply:**

   With: Ground equipment. Do not apply by air.

   Rate: Express 4 g/ac plus 2,4-D ester: 0.25 L/ac.

   Water volume: 40 L/ac.

   Pressure: 210 - 275 kPa.

   Nozzles: Use flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh screens or larger.

   Sprayer clean-out: To avoid injury to susceptible crops, clean sprayer thoroughly immediately after spraying. Ammonia must be used to deactivate Express when cleaning equipment. Use the following procedure:

   1. Drain tank; then flush tank, boom and hoses with clean water for a minimum of ten minutes to remove all visible residues.
   2. Fill the tank with clean water, then add 1 litre household Ammonia (containing a minimum of 3% ammonia) per 100 litres of water. (Do not use ammonia with chlorine bleach). Fill boom and hoses with solution and allow sprayer to sit for 15 minutes. Drain.
   3. Repeat step 2.
   4. Nozzles and screens should be removed and cleaned separately. To remove traces of ammonia, rinse the tank, hoses and booms thoroughly with clean water.
   5. Dispose of tank rinseate according to Provincial directions. Note: It is difficult to remove all traces of 2,4-D ester from a sprayer. Therefore, take extra precautions when spraying crops sensitive to 2,4-D ester immediately following a 2,4-D ester application.

8. **Application Tips:** Wild oat herbicides require a 4 - 5 day interval before or after an application of Express. Effectiveness may be reduced if spray mixture remains in tank for more than 24 hours. When tank mixed with Assert, apply within 12 hours of mixing.

9. **How it Works:** Absorbed by foliage and roots, inhibits cell elongation.

10. **Expected Results:** Express stops growth of susceptible weeds immediately. However, typical systoms (discoloration) of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions. Favorable growing conditions following treatment promote the activity of Express while cold, dry conditions delay the activity.

11. **Effects of Rainfall:** If rain occurs soon after application, control may be reduced. 4 - 6 hours of dry weather are needed to allow Express to be absorbed by weed foliage.

12. **Movement in Soil:** Express moves little in the soil. Its life in the soil is very short.

13. **Grazing and Cropping Restrictions:** Wheat or barley may be grazed or cut for hay 7 days after application. A minimum recropping interval of 2 months should be left between the application of Express and seeding of the next crop. The following crops can be seeded after 2 months: canola, flax, lentils, alfalfa.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) greater than 5,000 mg/kg. May irritate eyes, nose, throat and skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place.
17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Odyssey, Pursuit, Unity, Refine Extra, the DF component of Laser DF and the Plus component of Champion Plus and Triumph Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Odyssey, Pursuit, Unity, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

FlaxMax Ultra

(sethoxydim + clopyralid + MCPA ester)

Group 1,4

Manufacturer **BASF**

CAUTION POISON

1. **Formulations:**

   Poast Ultra: 450 g/L, 3.65 L.

   FlaxMax: 50 g/L clopyralid + 280 g/L MCPA ester: 2 x 8.1 L.

   Merge: 8.1 L.
2. **Registered Mixes:** None.
3. **Crops:** Flax (excluding low linolenic acid varieties).

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

REMARQUE IMPORTANTE CONCERNANT LES PAGES QUI SUIVENT

LES PAGES SUIVANTES ONT ÉTÉ REPRODUITES EN DOUBLE AFIN D'AMÉLIORER LA QUALITÉ DE REPRODUCTION

LES UTILISATEURS DOIVENT CONSULTER TOUTES LES PAGES REPRODUITES SUR LA FICHE AFIN D'OBTENIR LA LECTURE DU TEXTE INTÉGRAL

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FlaxMax Ultra (cont'd)

4. Weeds Controlled:

Weed species	Leaf Stage	Poast Ultra (mL/ac)	Flaxmax (mL/ac)	Merge (mL/ac)
Annual grasses barnyard grass, crabgrass (large), fall panicum, green foxtail, Persian darnel, proso millet, volunteer corn, wild millet, witchgrass, yellow foxtail	1 - 6	130	607	304
Wild oats and volunteer cereals wild oats, volunteer barley, volunteer wheat	1 - 4			
Annual broadleaf weeds flixweed, lamb's-quarters, shepherd's-purse, stinkweed, wild mustard, volunteer sunflower	2 - 4*			
Perennial weeds Canada thistle** – light infestations common groundsel	10 cm to early bud stage			
Annual grasses barnyard grass, crabgrass (large), fall panicum, green foxtail, Persian darnel, proso millet, volunteer corn, wild millet, witchgrass, yellow foxtail	1 - 6	190	810	405
Wild oats and volunteer cereals wild oats, volunteer barley, volunteer wheat	1 - 6			
Annual broadleaf weeds flixweed, lamb's-quarters, shepherd's-purse, stinkweed, wild mustard, volunteer sunflower, annual sow-thistle, common groundsel, redroot pigweed, Russian pigweed, scentless chamomile, smartweed tartary buckwheat, volunteer canola, wild buckwheat	2 - 4*			
Perennial weeds dandelion	spring rosette stage	190	810	405
Perennial weeds perennial sow-thistle	top growth	190	810	405
Perennial weeds Canada thistle – medium to heavy infestations	10 cm to early bud stage			

* Treatments made to broadleaf weeds after the 4 leaf stage may result in less than satisfactory control.

** Spring-long control with potential regrowth in the fall.

Note: Some delay in crop maturity and crop injury may result from the use of the high rate, but any potential yield reductions will usually be offset by increased yields due to better weed control.

5. Weeds Suppressed: None.

6. When Used:

Flax: 5 - 15 cm tall. Early spraying will reduce the risk of crop injury.

7. How to Apply:

With: Ground equipment.

Rate:

Poast Ultra	FlaxMax	Merge
130 - 190 mL/ac	607 - 809 mL/ac	304 - 405 mL/ac

Water volume: 40 - 60 L/ac.

Pressure: 200 - 275 kPa.

4. Weeds Controlled:

[illegible]	Leaf Stage	[illegible]	[illegible]	[illegible]
Annual grasses barnyard grass, crabgrass (large), fall panicum, green foxtail, Persian darnel, proso millet, volunteer corn, wild millet, witchgrass, yellow foxtail	1 - 6	130	607	304
Wild oats and volunteer cereals wild oats, volunteer barley, volunteer wheat	1 - 4			
Annual broadleaf weeds flixweed, lamb's-quarters, shepherd's-purse, stinkweed, wild mustard, volunteer sunflower	2 - 4*			
Perennial weeds Canada thistle** – light infestations common groundsel	10 cm to early bud stage			
Annual grasses barnyard grass, crabgrass (large), fall panicum, green foxtail, Persian darnel, proso millet, volunteer corn, wild millet, witchgrass, yellow foxtail	1 - 6	190	810	405
Wild oats and volunteer cereals wild oats, volunteer barley, volunteer wheat	1 - 6			
Annual broadleaf weeds flixweed, lamb's-quarters, shepherd's-purse, stinkweed, wild mustard, volunteer sunflower, annual sow-thistle, common groundsel, redroot pigweed, Russian pigweed, scentless chamomile, smartweed tartary buckwheat, volunteer canola, wild buckwheat	2 - 4*			
Perennial weeds dandelion	spring rosette stage	190	810	405
Perennial weeds perennial sow-thistle	top growth	190	810	405
Perennial weeds Canada thistle – medium to heavy infestations	10 cm to early bud stage			

* Treatments made to broadleaf weeds after the 4 leaf stage may result in less than satisfactory control.

** Spring-long control with potential regrowth in the fall.

Note: Some delay in crop maturity and crop injury may result from the use of the high rate, but any potential yield reductions will usually be offset by increased yields due to better weed control.

5. Weeds Suppressed: None.

6. When Used:

Flax: 5 - 15 cm tall. Early spraying will reduce the risk of crop injury.

7. How to Apply:

With: Ground equipment.

Rate:

[illegible]	[illegible]	[illegible]
130 - 190 mL/ac	607 - 809 mL/ac	304 - 405 mL/ac

Water volume: 40 - 60 L/ac.

Pressure: 200 - 275 kPa.

Nozzles: Flat fan nozzles tilted 45° forward preferred. **The use of flood jet or hollow cone nozzles is not recommended because of uneven and inadequate spray coverage.**

8. **Application Tips:** Early spraying will reduce the risk of crop injury. Ensure thorough and uniform spray coverage over the entire leaf area of the target weeds. When weeds are stressed due to drought, flooding or prolonged hot or cool temperatures (15°C or less), control can be reduced or delayed since weeds are not actively growing. Weed escapes may occur under prolonged stress conditions or low fertility. Do not make applications to weeds stressed longer than 20 days due to lack of moisture as unsatisfactory control can result. Ensure thorough and uniform spray coverage over the entire leaf area of the target weeds. Do not apply FlaxMax Ultra herbicide directly to or otherwise permit it to come into contact with sunflowers, legumes, fruit or vegetable crops, flowers or other desirable broadleaf plants, and take precautions to avoid spray mists drifting onto them. Equipment used to apply FlaxMax Ultra herbicide should not be used to apply other pesticides to sensitive crops without thorough cleaning.

9. **How it Works:** Poast is a contact and systemic herbicide. Uptake is primarily through the leaves and thorough coverage of foliage is important for consistent control. Susceptible annual grasses stop growing and slowly turn brown. Complete control takes 7 - 21 days. Clopyralid is a growth regulator type of herbicide, which is primarily absorbed through the foliage and is translocated to all parts of the plant causing leaves and stems to twist, yellow and then die. MCPA is a systemic herbicide for broadleaf weeds that is translocated throughout the plant causing rapid undifferentiated growth, which usually results in the death of susceptible weeds.

10. **Expected Results:**

    Grasses: Susceptible annual grasses stop growing and slowly turn brown. Complete control takes 7 - 21 days.

    Broadleaf weeds: Weeds start to twist after spraying; after twisting and bending, plants turn brown and die.

    Difficult to control weeds such as Canada thistle and wild buckwheat stop growing, change color to dark green and then turn yellow before they die. Death may not occur for 14 - 21 days after application. Some weak Canada thistle regrowth may occur by the end of the season.

11. **Effects of Rainfall:** Do not apply if rain is forecast within 6 hours of application.

12. **Movement in Soil:** Poast is relatively immobile in the soil and breaks down quickly. Clopyralid is somewhat soluble in water, but is generally not mobile in soil under typical prairie conditions. MCPA is readily leached from the soil.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields of flax within less than 7 days after application.

    Succeeding crops: Fields previously treated with FlaxMax Ultra herbicide can be seeded to wheat, barley, oats, rye, corn, flax, canola, sugar beets, mustard or should be summerfallowed. Do not seed to crops other than those listed above for at least one clear year following treatment.

14. **Toxicity:**

    Poast: Low acute mammalian toxicity. Acute LD_{50} (rats) 2500 mg/kg. Clopyralid: Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = greater than 2,000 mg/kg. Acute oral LD_{50} (bees) = greater than 100 mg/bee. Extremely low toxicity to fish.

    MCPA: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700-880). Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear overalls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in original, tightly-closed container and do not allow water to be introduced into this container. Store in cool (above 5°C), dry and well-ventilated area. If product is frozen, bring to room temperature and agitate before use.

17. **Resistance Management:** Use herbicides as part of an integrated control program and not as the only method of weed control. Use herbicides from different groups from one year to the next to reduce the risk of weeds developing herbicide resistance.

Fortress *(triallate + trifluralin)*

Group 3,8

Manufacturer: **Monsanto Canada Inc.**

1. **Formulations:** Granular; 10% triallate + 4% trifluralin; 22.7 kg bag.
2. **Registered Mixes:** None.
3. **Crops:** Barley (8.9), flax (8.0), mustard (9.0), rapeseed (9.0) (including canola), wheat [durum (9.0), spring (8.2)].
4. **Weeds Controlled:** Green (7.1) and yellow foxtail, wild oats (7.3).
5. **Weeds Suppressed:** Wild buckwheat, kochia, lamb's-quarters, redroot pigweed, Russian thistle.
6. **When Used:**

Spring: Pre-plant incorporated on barley, flax, spring and durum wheat and rapeseed. Do not apply preplant with wheat in soils with 0 - 4% organic matter.

Fall: Apply in fall, after September 15 until soil freeze-up. Do not apply preplant with wheat in soil with less than 2% organic matter.

Note:

Fall applications: Where erosion may be a problem, maximize crop residue cover with only one fall tillage incorporation.

7. **How to Apply:**

With: Aircraft or ground equipment.

Rate:

	Fall granular Fortress rates (kg/ac)				
Crop	**Less than 2% organic matter**	**2 - 4% organic matter**	**4 - 6% organic matter**	**Greater than 6% organic [illegible]**	**Greater than 6% organic matter**
Barley	4.5	5.7	5.7	6.9	6.9
Rapeseed/flax/mustard	5.7	5.7	5.7	6.9	6.9
Wheat (durum, spring)	—	4.5	5.7	5.7	6.9

		Spring granular Fortress rates (kg/ac)				
Crop	**Application timing**	**Less than 2% organic matter**	**2 - 4% organic matter**	**4 - 6% organic matter**	**Greater than 6% organic matter**	**Seeding depth (cm)**
Barley		—	4.5	5.7	6.9	5 - 7.5
Rapeseed/flax/mustard		5.7	5.7	6.9	6.9	as desired
Wheat (durum, spring)	Before seeding	—	—	4.5	5.7	5 - 7.5

	Fall surface granular fortress rates (kg/ha)				
Crop	Less than 2% organic matter	2 - 4% organic matter	4 - 6% organic matter	Greater than 6% organic matter	Seeding depth (cm)
Barley	4.5	5.7	5.7	6.9	5 - 7
Rapeseed/flax/mustard	5.7	5.7	5.7	6.9	as desired
Wheat (durum, spring)	—	4.5	5.7	5.7	5 - 7

Incorporation:

Time: First incorporation within 24 hours, second incorporation can be either in the fall or spring.

Implement: Use a double disc or light duty cultivator plus harrows. Harrowing does not provide effective incorporation if compacted soil prevents penetration of harrow teeth, if trash accumulates in harrow section or if harrows bounce.

8. **Application Tips:** Calibrate equipment to deliver desired amount of product. Use only a hoe-drill or a double disc press drill to seed barley or wheat into a Fortress-treated field. Do not apply to soil with less than 2% organic matter if it is to be seeded to wheat. Do not apply Fortress for wheat on land that has been treated with trifluralin since June 1 of the previous year.

   Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 6.0 - 7.5 cm. Wheat must be seeded at least 1.0 cm below the treated layer. Do not seed deeper than 7.5 cm. To ensure an even crop stand, increase the usual seeding rate of barley and wheat by 10%. Seed into warm, moist seedbed.

   Fall surface application: Where fields are prone to water and/or wind erosion and fall tillage is therefore undesirable, fall surface applications should be made after October 15 or within three weeks of soil freeze-up (average soil temperature at the 5 cm depth should be 4°C or less). Fall surface application should be made to standing stubble, chemical fallow or summerfallow fields in a state of low soil erodibility. Avoid smooth, hard packed soil conditions in summerfallow which may allow granules to drift. Surface applications should not be made to fields covered in snow or that have excessive crop residue, which will not allow granules contact with soil. Under excessively warm and/or wet conditions between application and crop emergence, control may be reduced. For best results under heavy wild oat infestations, use the incorporated treatments only.

9. **How it Works:** Absorbed by wild oat shoots and foxtail roots, usually resulting in death before emergence. Under dry conditions, some wild oats and foxtail may emerge before being killed.

10. **Expected Results:**

    Weeds: Wild oats and foxtail die before they emerge. Weed control may be reduced under conditions of prolonged, cool soil temperatures at the time of germination or extreme drought in spring.

    Crops: Thinning in barley and wheat are known to occur under conditions of heavy rainfall and/or cold weather after application and before crop emergence. In most cases, thinning is more than offset by tillering. Some thinning may be noted on eroded knolls. **Poor results may be expected if** there is incomplete incorporation due to wet, cloddy soil or heavy trash, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

11. **Effects of Rainfall:** Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance.

12. **Movement in Soil:** Negligible.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Succeeding crops: Under normal conditions, Fortress carry over will not harm crops grown in rotation. As a precaution, domestic oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not be grown in rotation following a Fortress-treated crop.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000). May cause skin and eye irritation.

17. **Resistance Management:** Use herbicides as part of an integrated control program and not as the only method of weed control. Use herbicides from different groups from one year to the next to reduce the risk of weeds developing herbicide resistance.

Fortress *(triallate + trifluralin)*

Group 3,8

Manufacturer: Monsanto Canada Inc.

1. **Formulations:** Granular: 10% triallate + 4% trifluralin: 22.7 kg bag.
2. **Registered Mixes:** None.
3. **Crops:** Barley (8.9), flax (8.0), mustard (9.0), rapeseed (9.0) (including canola), wheat [durum (9.0), spring (8.2)].
4. **Weeds Controlled:** Green (7.1) and yellow foxtail, wild oats (7.3).
5. **Weeds Suppressed:** Wild buckwheat, kochia, lamb's-quarters, redroot pigweed, Russian thistle.
6. **When Used:**

   Spring: Pre-plant incorporated on barley, flax, spring and durum wheat and rapeseed. Do not apply preplant with wheat in soils with 0 - 4% organic matter.

   Fall: Apply in fall, after September 15 until soil freeze-up. Do not apply preplant with wheat in soil with less than 2% organic matter.

   Note:

   Fall applications: Where erosion may be a problem, maximize crop residue cover with only one fall tillage incorporation.
7. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate:

Fall granular Fortress rates (kg/ac)

Crop	Less than 2% organic matter	2 - 4% organic matter	4 - 6% organic matter	Greater than 6% organic matter	Greater than 8% organic matter
Barley	4.5	5.7	5.7	6.9	6.9
Rapeseed/flax/mustard	5.7	5.7	5.7	6.9	6.9
Wheat (durum, spring)	—	4.5	5.7	5.7	6.9

Spring granular fortress rates (kg/ac)

Crop	Application timing	Less than 2% organic matter	2 - 4% organic matter	4 - 6% organic matter	Greater than 6% organic matter	Seeding depth (cm)
Barley		—	4.5	5.7	6.9	5 - 7.5
Rapeseed/flax/mustard		5.7	5.7	6.9	6.9	as desired
Wheat (durum, spring)	Before seeding	—	—	4.5	5.7	5 - 7.5

Fall surface granular fortress rates (kg/ac)

Crop	Less than 2% organic matter	2 - 4% organic matter	4 - 6% organic matter	Greater than 6% organic matter	Seeding depth (cm)
Barley	4.5	5.7	5.7	6.9	5 - 7
Rapeseed/flax/mustard	5.7	5.7	5.7	6.9	as desired
Wheat (durum, spring)	—	4.5	5.7	5.7	5 - 7

Incorporation:

Time: First incorporation within 24 hours, second incorporation can be either in the fall or spring.

Implement: Use a double disc or light duty cultivator plus harrows. Harrowing does not provide effective incorporation if compacted soil prevents penetration of harrow teeth, if trash accumulates in harrow section or if harrows bounce.

8. **Application Tips:** Calibrate equipment to deliver desired amount of product. Use only a hoe-drill or a double disc press drill to seed barley or wheat into a Fortress-treated field. Do not apply to soil with less than 2% organic matter if it is to be seeded to wheat. Do not apply Fortress for wheat on land that has been treated with trifluralin since June 1 of the previous year.

   Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 6.0 - 7.5 cm. Wheat must be seeded at least 1.0 cm below the treated layer. Do not seed deeper than 7.5 cm. To ensure an even crop stand, increase the usual seeding rate of barley and wheat by 10%. Seed into warm, moist seedbed.

   Fall surface application: Where fields are prone to water and/or wind erosion and fall tillage is therefore undesirable, fall surface applications should be made after October 15 or within three weeks of soil freeze-up (average soil temperature at the 5 cm depth should be 4 C or less). Fall surface application should be made to standing stubble, chemical fallow or summerfallow fields in a state of low soil erodibility. Avoid smooth, hard packed soil conditions in summerfallow which may allow granules to drift. Surface applications should not be made to fields covered in snow or that have excessive crop residue, which will not allow granules contact with soil. Under excessively warm and/or wet conditions between application and crop emergence, control may be reduced. For best results under heavy wild oat infestations, use the incorporated treatments only.

9. **How it Works:** Absorbed by wild oat shoots and foxtail roots, usually resulting in death before emergence. Under dry conditions, some wild oats and foxtail may emerge before being killed.

10. **Expected Results:**

    Weeds: Wild oats and foxtail die before they emerge. Weed control may be reduced under conditions of prolonged, cool soil temperatures at the time of germination or extreme drought in spring.

    Crops: Thinning in barley and wheat are known to occur under conditions of heavy rainfall and/or cold weather after application and before crop emergence. In most cases, thinning is more than offset by tillering. Some thinning may be noted on eroded knolls. **Poor results may be expected if** there is incomplete incorporation due to wet, cloddy soil or heavy trash, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

11. **Effects of Rainfall:** Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance.

12. **Movement in Soil:** Negligible.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Succeeding crops: Under normal conditions, Fortress carry over will not harm crops grown in rotation. As a precaution, domestic oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not be grown in rotation following a Fortress-treated crop.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000). May cause skin and eye irritation.

Fortress (cont'd)

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a dry place.
17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Heritage, Trifluralin 10G, Trifluralin 400, Rival and Fortress) will not control trifluralin-tolerant green foxtail. To delay selection or reduce the spread of trifluralin tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin tolerant green foxtail.

Freedom Gold *(thifensulfuron methyl + quizalofop-ethyl)*

Groups 1,2

Manufacturer: **DuPont Canada Inc.**

CAUTION POISON

1. **Formulations:**
   1. Freedom (Dry flowable): 75%; 320 g canister.
   2. Assure II (emulsifiable concentrate): 96 g/L; 1 x 8 L.
   3. 1 jug Sure-Mix (adjuvant): 1 x 8 L.
2. **Registered Mixes:** Lontrel (170 mL/ac).

   Mixing instructions:
   1. Fill tank with 1/2 - 3/4 amount of required water with agitator running.
   2. Add the required amount of Freedom herbicide and **ensure it is completely in suspension**.
   3. Add required amount of Assure II and continue agitating.
   4. Add remainder of water, then add the Sure-Mix (adjuvant). Continuous agitation is required.
3. **Crops:** Currently registered 1999 varieties of SMART canola (spring).
4. **Weeds Controlled:**

   barnyard grass
   chickweed*
   corn spurry
   cow cockle
   green foxtail
   green smartweed
   hemp-nettle
   lady's-thumb (smartweed)
   lamb's-quarters
   redroot pigweed
   Russian thistle
   stinkweed
   volunteer barley
   volunteer corn
   volunteer oats
   volunteer rapeseed (excluding SMART canola)
   volunteer wheat
   wild buckwheat**
   wild mustard
   wild oats

   * Chickweed: Apply Freedom Gold herbicide plus recommended surfactant when the chickweed is small (1 - 6 leaf) and actively growing.
   ** Wild buckwheat: 1 - 3 leaf stage.
5. **Weeds Suppressed:** Quackgrass, kochia.
6. **When Used:** Apply post-emergence to crop from 3 - 6 leaf stage of SMART canola. Apply when annual grassy weeds are in the 2 leaf to early tillering stage and when quackgrass is in the 2 - 6 leaf stage. Best results on wild oats if application is made prior to tillering. For optimum control, apply Freedom Gold when broadleaved weeds are less than 10 cm tall or across.
7. **How to Apply:**

   With: Ground equipment only. Do not apply by air.

Rate: Assure II 200 mL/ac + Freedom 8 g/ac + 5 L of Sure-Mix per 1,000 litres of spray solution. Follow mixing instructions above.

Water volume: Minimum of 40 L/ac.

Pressure: 210 - 275 kPa.

Nozzles: Use flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh screens or larger.

Sprayer clean up: To avoid injury to susceptible crops, clean sprayer thoroughly immediately after spraying. When cleaning equipment, ammonia must be used to deactivate Freedom.

1. Drain and flush tank, boom and hoses with clean water for a minimum of ten minutes. Visually inspect the tank to ensure the removal of all visible residues of Freedom. If necessary, repeat step 1.
2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum of 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes with agitation. Again, flush the hoses, booms and nozzles with the cleaning solution and drain the tank.
3. Remove nozzles and screens, and clean them separately in bucket containing cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** Under dry conditions, control may be reduced. Large plants may regrow after treatment. When very high weed seedling population occurs, larger seedlings may interfere with coverage of smaller seedlings, and control may be reduced. Regrowth may also occur if crop competitiveness is reduced by thin stands and/or reduced vigour. Do not apply Freedom Gold to plants stressed by severe conditions such as drought, low fertility, saline soils, water-logged soils, disease or insect damage as crop injury may result.

9. **How it Works:** Assure II is a systemic herbicide that is rapidly absorbed and readily translocated from the treated foliage to the root system and growing points of the plant. Freedom is absorbed by the foliage and roots. It inhibits cell elongation.

10. **Expected Results:** Broadleaved weed growth stops almost immediately. Grassy weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the younger plant tissues is followed by a progressive collapse of the remaining foliage. These signs will generally be observed in 1 - 3 weeks, depending on the grass species treated and the environmental conditions. Poor results may be expected with improper mixing, timing or coverage, or when weeds are under stress.

11. **Effects of Rainfall:** If rainfall occurs soon after application, control may be reduced. Four to six hours of dry weather are needed to allow Freedom Gold to be absorbed by weed foliage. Environmental conditions that slow the drying of Freedom Gold on the foliage, such as high relative humidity, cool air temperature or cloud cover, may increase the time required for absorption.

12. **Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral to acidic conditions. Product is relatively immobile in most agricultural soils.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields or harvest for forage or hay. Do not harvest within 74 days of treatment.

    Minimum crop rotation guidelines: Wheat or barley can be replanted any time after application. Wait 30 days after application to plant any crop other than wheat or barley.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) > 5,000 mg/kg.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place, but not below 5°C.

17. **Resistance Management:** Some of the naturally occurring biotypes of certain weeds listed on this label may not be controlled. To delay selection of resistant populations, rotate the use of Group 1 and Group 2 products with other products effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Fusion

(fenoxaprop-p-ethyl + fluazifop-p-butyl)

Group 1

Manufacturer **Aventis Crop Science**

CAUTION POISON

1. **Formulations: Component #1** (fenoxaprop-p-ethyl), emulsifiable concentrate, 80.5, g/L, 3.7 L jug; **Component #2** (fluazifop-p-butyl), emulsifiable concentrate, 125 g/L, 6.5 L jug.
2. **Registered Mixes:**

   Canola and triazine tolerant canola: Lontrel (227 mL/ac), Muster (8 - 12 g/ac – no surfactant required (Argentine varieties only).

   Flax: Buctril M (400 mL/ac), MCPA ester or amine 500 (340 mL/ac); Buctril M Gel (one bag per 10 acres).
3. **Crops:** Canola, triazine tolerant canola, flax (excluding low linolenic acid varieties), lentils, field peas, mustard.
4. **Weeds Controlled:** Wild oats, green foxtail, volunteer wheat, volunteer barley, persian darnel, barnyard grass.
5. **Weeds Suppressed:** None.
6. **When Used:** Apply to emerged, young, actively growing weeds. Weeds that emerge after application will not be controlled.

   Annual grassy weeds: 1 - 6 leaf stage of growth.

   Crop: Do not apply after the fifth leaf stage of canola. Do not apply later than the sixth node stage of lentils.
7. **How to Apply:**

   With: Ground equipment. Do not apply by air.

   Rate: Component #1 at 185 mL/ac and **Component #2** at 325 mL/ac.

   Caution: Both components of the Fusion Tank Mix must be applied at the recommended rate or a reduction in grassy weed control may result.

   Water volume: 22.5 - 45 L/ac.

   Pressure: 275 kPa or 310 kPa if using check valves.

   Nozzles: The use of 80° or 110° flat fan nozzles is recommended for optimal spray coverage.

   Mixing instructions:
   1. Ensure the spray tank is thoroughly clean.
   2. Fill the tank half full with clean water and start agitation or bypass system.
   3. If a broadleaf herbicide is to be used with Fusion Tank Mix, add it first and agitate.
   4. Slowly add the correct amount of **Component #1** to the spray tank. Agitate thoroughly until **Component #1** is mixed completely.
   5. Add the correct amount of **Component #2** and continue agitation.
   6. Triple rinse the emptied containers into the spray tank.
   7. Add the remaining amount of water while agitation continues. Spray out immediately. Spray mixture should not be left in tank overnight.
   8. Thoroughly clean the spray tank after using Fusion Tank Mix and before using any other pesticide.

8. **Application Tips:** A time interval of 4 days prior to application or 4 days after application of Fusion tank mix is required before any other pesticide can be applied, unless registered as a tank mix. During periods of stress, plants are not actively growing. When daytime temperatures before and after application are very hot, combined with very dry conditions and low humidity, plants are under stress. Application of Fusion during these periods may result in substantially reduced control. Application of the spray at a forward angle of 45° will result in better penetration of the canopy and better coverage. Do not apply to crop stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result.

9. **How it Works:** Contact as well as systemic, no soil activity. Regions of high meristematic activity such as root and shoot tips are known to be affected.

10. **Expected Results:**

    Grassy weeds: Reduction of leaf growth and chlorotic blotching within 1 - 3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and death within 14 - 21 days after application.

11. **Effects of Rainfall:** No effect 2 hours after application.

12. **Movement in Soil:** No soil movement. This product will not leach into the soil.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields prior to harvest.
    Pre-harvest interval: Canola: 80 days, Flax: 80 days, Lentils: 82 days, Field peas: 75 days, Mustard: 70 days.

14. **Toxicity:**

    Component #1 (fenoxaprop-p-ethyl): Acute oral LD_{50} (rats) (mg/kg) = 3,355. May cause eye irritation and severe irritation of the skin.

    Component #2 (fluazifop-p-butyl): Acute oral LD_{50} (rats) (mg/kg) = 2,451.

    Warning: Experimental feeding studies in rats have demonstrated that the active ingredient in **Component #2** can produce birth defects and other adverse effects in the developing fetus of rats. **Women capable of bearing children should be particularly careful when handling this product.** Occupational exposure to this product will be reduced by strict adherence to the handling precautions. Use directions provided.

15. **Precautions, First Aid:** Causes eye and skin irritation. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    First aid: If the tank mix spray solution, **Component #1** or **Component #2** are swallowed, do **not** induce vomiting but rush patient to nearest hospital taking label *Directions For Use* or the labelled container with you. **If inhaled**, remove patient from site of exposure.

16. **Storage:** Keep away from fire, open flame or other heat sources. Do not store below freezing. If stored for 1 year or longer, shake well before using. Keep in original container during storage.

Garlon 4 *(triclopyr)*

Available only to authorized pesticide applicators

Group 4

Manufacturer Dow AgroSciences Canada Inc

☠ CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; 480 g/L; 10 L jug; 110 L drum.
2. **Registered Mixes:** None.

M121

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Garlon 4 (cont'd)

3. **Crops:** Utility rights of way, fence rows, pipelines, power lines, communication lines, roadsides and rail road, industrial manufacturing and storage sites.

4. **Weeds Controlled:**

Brush

alder
aspen
balsam poplar*
birch
chokecherry*
cottonwood
dogwood
elderberry
maples*
pine*
poison oak
raspberry*
tamarack
wild rose
willow

* Hard to control.

Weeds

burdock
curled dock
dandelion
field bindweed
lamb's-quarters
smartweed
smooth bedstraw
wild lettuce
vetch

5. **Weeds Suppressed:** None.

6. **When Used:**

Foliar applications: After foliage is well developed. Unsatisfactory results are likely if foliage has lost its normal color and/or texture.

Basal bark applications: Any time (dormant or growing) the target zone of the stem and/or root collar can be clearly seen and treated. Stems must be dry when application is made.

7. **How to Apply:**

A. **Ground Application**

With: Boom, Radi-arc, OC nozzles, handgun or backpack.

Rate:
Brush: 1.6 - 3.2 L/ac.
Weeds: 0.4 - 1.6 L/ac.

Water volume: 100 L/ac or more.

Nozzles: Flat fan recommended.

B. **Aerial Application**

With: Fixed wing or rotary wing aircraft.

Rate:
Brush: 1.6 - 3.26/ac.

Water volume: 12 L/ac minimum. 60 L/ac with a thru-valve boom.

Nozzles: Coarse droplet producing conventional disc and core nozzles (such as D8-46 or D10-46), the Microfoil boom or the Thru-Valve boom.

8. **Application Tips:**

Foliar application: Weeds and brush should be actively growing. Best results occur when uniform coverage occurs. Higher application volumes (200 L/ac or more), depending on the application system, provide the desired uniformity of coverage. Do not treat woody plants more than 2.5 m in height. For woody plants exceeding 2.5 metres, cut and spray regrowth or use basal bark treatment.
Use higher rates for species listed as hard to control. Use higher rate for late summer application when plant growth rates are reduced. If lower rates are used on hard to control species, resprouting may occur and treatment may be necessary the following year. Do not contaminate water. Keep out of lakes, streams, ponds, irrigation ditches and domestic water supplies. Avoid drift or overspray of vegetable crops, grapes, fruits, flowers and other desirable broadleaf plants.

3. **Crops:** Utility rights of way, fence rows, pipelines, power lines, communication lines, roadsides and rail road, industrial manufacturing and storage sites.

4. **Weeds Controlled:**

alder
aspen
balsam poplar*
birch
chokecherry*
cottonwood
dogwood
elderberry
maples*
pine*
poison oak
raspberry*
tamarack
wild rosa
willow

* Hard to control.

burdock
curled dock
dandelion
field bindweed
lamb's-quarters
smartweed
smooth bedstraw
wild lettuce
vetch

5. **Weeds Suppressed:** None.

6. **When Used:**

Foliar applications: After foliage is well developed. Unsatisfactory results are likely if foliage has lost its normal color and/or texture.

Basal bark applications: Any time (dormant or growing) the target zone of the stem and/or root collar can be clearly seen and treated. Stems must be dry when application is made.

7. **How to Apply:**

A. Ground Application

With: Boom, Radi-arc, OC nozzles, handgun or backpack.

Rate:
Brush: 1.6 - 3.2 L/ac.
Weeds: 0.4 - 1.6 L/ac.

Water volume: 100 L/ac or more.

Nozzles: Flat fan recommended.

B. Aerial Application

With: Fixed wing or rotary wing aircraft.

Rate:
Brush: 1.6 - 3.26/ac.

Water volume: 12 L/ac minimum. 60 L/ac with a thru-valve boom.

Nozzles: Coarse droplet producing conventional disc and core nozzles (such as D8-46 or D10-46), the Microfoil boom or the Thru-Valve boom.

8. **Application Tips:**

Foliar application: Weeds and brush should be actively growing. Best results occur when uniform coverage occurs. Higher application volumes (200 L/ac or more), depending on the application system, provide the desired uniformity of coverage. Do not treat woody plants more than 2.5 m in height. For woody plants exceeding 2.5 metres, cut and spray regrowth or use basal bark treatment.
Use higher rates for species listed as hard to control. Use higher rate for late summer application when plant growth rates are reduced. If lower rates are used on hard to control species, resprouting may occur and treatment may be necessary the following year. Do not contaminate water. Keep out of lakes, streams, ponds, irrigation ditches and domestic water supplies. Avoid drift or overspray of vegetable crops, grapes, fruits, flowers and other desirable broadleaf plants.

One sided low volume basal bark treatment: Use on plant with basal stem less than 15 cm in diameter. Mix 20 - 30 L of Garlon 4 in enough oil dilutent to make 100 L of spray mixture. Spray the basal parts of at least one side of the trunks of brush and trees to thoroughly wet the lower 30 cm, including the root collar. Apply at any time, including winter months, except when snow or water prevent spraying at the ground line.

Streamline basal bark treatment: Use 20 - 30 L of Garlon 4 in enough oil dilutent to make 100 L of spray mixture. Use on stems that are 8 cm in basal diameter. Apply sufficient spray to form a band 5 cm wide. If stems are 8 - 15 cm in diameter, treat both sides of the stem so that a 5 cm wide band is treated. Direct spray to a point on the stem 30 - 50 cm above ground level. Old rough bark may require more spray than smooth young bark. Apply any time, including winter months, except when snow or water prevent spraying at desired height above ground level.

To control resprouting of cut stumps of woody species, mix 20 - 30 L of Garlon 4 in enough oil to make 100 L of spray mixture. Apply with a backpack sprayer using a flat fan or a solid cone nozzle. Thoroughly wet outer portion of the cut surface adjacent to the cambium and the sides of the stumps, including the root collar area, but not to the point of runoff. Apply at any time including winter months, except when snow or water prevents spraying to the ground line. Care must be given to ensure treatment of all cut stems in a clump.

9. **How it Works:** Interferes with cell division and elongation, causing leaf cupping, stem distortion and eventual death. Garlon 4 is absorbed through leaves and stems of susceptible plants.

10. **Expected Results:** Within 1 or 2 weeks of treatment, leaves of treated vegetation display cupping and browning. Within the first season, smaller twigs and stems become brittle and die.

11. **Effects of Rainfall:** Rain within 2 hours of application may cause poor results to occur.

12. **Movement in Soil:** Triclopyr is relatively strongly bound to organic carbon and clay colloids, so movement with soil water is unlikely to occur.

13. **Grazing and Cropping Restrictions:**

    Grazing or harvesting green forage:

    1. Lactating dairy animals:
       Up to 1.9 L/ac – Do not feed for 14 days following treatment.
       1.9 - 3.2 L/ac – Do not feed for 60 days following treatment.
    2. Other livestock:
       Up to 1.9 L/ac – No restriction.
       1.9 - 3.2 L/ac – Do not feed for 14 days following treatment.

    Note: If less than 25% of grazed area is treated, there is no grazing restriction (for other livestock only).

    Haying (harvesting of dried forage):

    1. Lactating dairy animals: Do not feed hay which has been harvested within 60 days of treatment.
    2. Other livestock:
       Up to 1.9 L/ac – Do not harvest hay for 7 days following treatment.
       1.9 - 3.2 L/ac: – Do not harvest hay for 14 days following treatment.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (male rats) (mg/kg) = technical triclopyr (729); Formulated product (2,460).

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place above -2°C. If stored below -2°C, agitate before use.

Glyfos/Renegade/Victor/Credit

(glyphosate)

Group 9

Manufacturer: **Cheminova/Cargill/Aventis Crop Science/Nufarm**

CAUTION IRRITANT

1. **Formulations:**

   Glyfos: 360 g/L acid equivalent present as isopropylamine salt, 10 L, 115 L, 1000 L containers.

   Renegade, Victor, Credit: 356 g/L acid equivalent present as isopropylamine salt, 10 L, 115 L, 750 L containers.

2. **Registered Mixes:**

   Zero till: Pardner + non-ionic surfactant.

   Chemical fallow: 2,4-D amine (or Banvel or Pardner) + non-ionic surfactant.

   Non-ionic surfactants: Ag-Surf, Agral 90, Companion, LI 700. Mixing with other pesticides: Not recommended.

3. **Crops:** Prior to planting (all crops), fall stubble treatment, spot treatment (in-crop), non-crop areas, minimum or zero till cropping systems, pasture renovation, summer fallow, preharvest in flax (including linola), wheat, barley, canola, lentils, peas, soybeans.

4. **Weeds Controlled:**

Annuals

annual bluegrass (9.0)
annual sow-thistle
Canada fleabane
common ragweed
crabgrass
dodder
downy brome
flixweed
green foxtail (7.9)
hemp-nettle
kochia
lady's-thumb
lamb's-quarters
narrow-leaved hawk's-beard
narrow-leaved vetch
Persian darnel
prickly lettuce
redroot pigweed
Russian thistle
shepherd's-purse
stinkweed
volunteer barley
volunteer canola
volunteer corn
volunteer flax
volunteer mustard
volunteer wheat
wild mustard
wild oats

Perennials

alfalfa
Canada bluegrass (9.0)
Canada thistle (7.8)
cattail
common milkweed
cottontop
curled dock
field bindweed (7.2)
foxtail barley
hemp dogbane
hoary cress
Japanese knotweed
Kentucky bluegrass (9.0)
perennial sow-thistle
poison ivy
Purple loosestrife
quackgrass
smooth bromegrass
toadflax
wormwood
yellow nutsedge

Woody

alder
birch
maple
pine
poplar
raspberry
sheep laurel
snowberry
willow

5. **Weeds Suppressed:** Some weeds suppressed at lower rates.

6. **When Used:**

   Annual weeds: Grassy and broadleaf weeds at least 15 cm tall and actively growing. Dodder: spot treatment in sugar beets.

   Perennial weeds:

   Canada thistle (bud stage): At or beyond bud stage of growth.

   Canada thistle (fall rosette): 15 cm in diameter and at least 5 weeks of growth. Majority of them in a rosette stage.

   Dandelion: Prior to seeding and post harvest.

   Field bindweed: At or beyond full bloom and actively growing.

Milkweed: Bud to full bloom stage of growth.

Note: Reduced results may occur on plants treated after full bloom.

Quackgrass (spring, summer fallow, fall stubble): At least 20 cm in height (3 - 4 leaf stage) of growth and actively growing.

Quackgrass (fall-tilled ground): Delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

Other perennials: Mostly in head and early bud stage.

Brush: Actively growing brush from June through August.

7. **How to Apply: Do not use galvanized steel or unlined steel tanks, as a combustible gas may be formed.**

With: Ground equipment only: boom equipment, handgun, high volume equipment, wipers.

Rate:

Annual Weed Control

Rate (per ac.)	Growth stage	Weeds controlled	Comments (apply in 20 - 40 L/ac water)
305 mL	- weeds up to 8 cm in height	- wild oats, green foxtail, volunteer barley, volunteer wheat, volunteer canola, wild mustard, lady's-thumb, stinkweed	- For wild oats, apply at 1 - 3 leaf stage. - Add 150 mL of a surfactant registered for use such as Agral 90, Ag Surf and Companion. - For heavy wild oat infestations, use 405 mL/ac rate.
405 mL	- weeds 8 cm to 15 cm in height	- for annual grasses listed above plus foxtail barley* (suppression only), all other broad leaves listed above plus flixweed** and kochia**	- Add 150 mL of surfactant registered for use as listed above. - Apply before initiation or senescence. **Suppression only.
505 - 770 mL	- weeds up to 15 cm in height	- all annual grasses listed above plus downy brome, giant foxtail, and Persian darnel - all annual broadleaved weeds listed above plus lamb's-quarters, redroot pigweed, hemp-nettle, flixweed, Russian thistle, volunteer flax, common ragweed*, Canada fleabane*, wild buckwheat**, narrow-leaved hawk's-beard***	- No additional surfactant is required. - ***Do not use** these rates on plants greater than 8 cm in height. - **For 3 - 4 leaf stage, use 770 mL/ac rate. - ***For weeds 8 - 15 cm in height, use 770 mL/ac rate.
910 mL	- weeds up to 15 cm in height	- all annual grasses listed above, plus crab grass and annual blue grass - all broadleaved listed above plus kochia, prickly lettuce, shepherd's-purse, annual sow-thistle and narrow-leaved vetch	- For additional broadleaved weed control option, refer to tank mix table.
1.4 L	- weeds over 15 cm in height	- all annual grasses and broadleaved weeds listed above	- For additional broadleaved weed control option, refer to tank mix table.

Glyfos/Renegade/Victor/Credit

(glyphosate)

Group 9

Manufacturer: Cheminova/Cargill/Aventis Crop Science/Nufarm

CAUTION IRRITANT

1. Formulations:

Glyfos: 360 g/L acid equivalent present as isopropylamine salt, 10 L, 115 L, 1000 L containers.

Renegade, Victor, Credit: 356 g/L acid equivalent present as isopropylamine salt, 10 L, 115 L, 750 L containers.

2. Registered Mixes:

Zero till: Pardner + non-ionic surfactant.

Chemical fallow: 2,4-D amine (or Banvel or Pardner) + non-ionic surfactant.

Non-ionic surfactants: Ag-Surf, Agral 90, Companion, LI 700. Mixing with other pesticides: Not recommended.

3. Crops:

Prior to planting (all crops), fall stubble treatment, spot treatment (in-crop), non-crop areas, minimum or zero till cropping systems, pasture renovation, summer fallow, preharvest in flax (including linola), wheat, barley, canola, lentils, peas, soybeans.

4. Weeds Controlled:

Annuals

- annual bluegrass (9.0)
- annual sow-thistle
- Canada fleabane
- common ragweed
- crabgrass
- dodder
- downy brome
- flixweed
- green foxtail (7.9)
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarters
- narrow-leaved hawk's-beard
- narrow-leaved vetch
- Persian darnel
- prickly lettuce
- redroot pigweed
- Russian thistle
- shepherd's-purse
- stinkweed
- volunteer barley
- volunteer canola
- volunteer corn
- volunteer flax
- volunteer mustard
- volunteer wheat
- wild mustard
- wild oats

Perennials

- alfalfa
- Canada bluegrass (9.0)
- Canada thistle (7.8)
- cattail
- common milkweed
- cottontop
- curled dock
- field bindweed (7.2)
- foxtail barley
- hemp dogbane
- hoary cress
- Japanese knotweed
- Kentucky bluegrass (9.0)
- perennial sow-thistle
- poison ivy
- Purple loosestrife
- quackgrass
- smooth bromegrass
- toadflax
- wormwood
- yellow nutsedge

Brush

- alder
- birch
- maple
- pine
- poplar
- raspberry
- sheep laurel
- snowberry
- willow

5. Weeds Suppressed:

Some weeds suppressed at lower rates.

6. When Used:

Annual weeds: Grassy and broadleaf weeds at least 15 cm tall and actively growing. Dodder: spot treatment in sugar beets.

Perennial weeds:

Canada thistle (bud stage): At or beyond bud stage of growth.

Canada thistle (fall rosette): 15 cm in diameter and at least 5 weeks of growth. Majority of them in a rosette stage.

Dandelion: Prior to seeding and post harvest.

Field bindweed: At or beyond full bloom and actively growing.

Milkweed: Bud to full bloom stage of growth.

Note: Reduced results may occur on plants treated after full bloom.

Quackgrass (spring, summer fallow, fall stubble): At least 20 cm in height (3 - 4 leaf stage) of growth and actively growing.

Quackgrass (fall-tilled ground): Delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

Other perennials: Mostly in head and early bud stage.

Brush: Actively growing brush from June through August.

7. **How to Apply: Do not use galvanized steel or unlined steel tanks, as a combustible gas may be formed.**

With: Ground equipment only: boom equipment, handgun, high volume equipment, wipers.

Rate:

Annual Weed Control

Rate (per ac.)	Growth stage	Weeds controlled	Comments (apply in 20 - 40 L/ac water)
305 mL	- weeds up to 8 cm in height	- wild oats, green foxtail, volunteer barley, volunteer wheat, volunteer canola, wild mustard, lady's-thumb, stinkweed	- For wild oats, apply at 1 - 3 leaf stage. - Add 150 mL of a surfactant registered for use such as Agral 90, Ag Surf and Companion. - For heavy wild oat infestations, use 405 mL/ac rate.
405 mL	- weeds 8 cm to 15 cm in height	- for annual grasses listed above plus foxtail barley* (suppression only), all other broad leaves listed above plus flixweed** and kochia**	- Add 150 mL of surfactant registered for use as listed above. - Apply before initiation or senescence. **Suppression only.
505 - 770 mL	- weeds up to 15 cm in height	- all annual grasses listed above plus downy brome, giant foxtail, and Persian darnel - all annual broadleaved weeds listed above plus lamb's-quarters, redroot pigweed, hemp-nettle, flixweed, Russian thistle, volunteer flax, common ragweed*, Canada fleabane*, wild buckwheat**, narrow-leaved hawk's-beard***	- No additional surfactant is required. - ***Do not use** these rates on plants greater than 8 cm in height. - **For 3 - 4 leaf stage, use 770 mL/ac rate. - ***For weeds 8 - 15 cm in height, use 770 mL/ac rate.
910 mL	- weeds up to 15 cm in height	- all annual grasses listed above, plus crab grass and annual blue grass - all broadleaved listed above plus kochia, prickly lettuce, shepherd's-purse, annual sow-thistle and narrow-leaved vetch	- For additional broadleaved weed control option, refer to tank mix table.
1.4 L	- weeds over 15 cm in height	- all annual grasses and broadleaved weeds listed above	- For additional broadleaved weed control option, refer to tank mix table.

Glyfos/Renegade/Victor/Credit (cont'd)

Annual Weed Control with Roundup Tank Mixtures for Summer fallow and Minimum Tillage Systems

Tank mixtures	Rate (mL/acre)	Weeds controlled	Comments (apply in 20 - 40 L/acre water and add 140 mL/acre of surfactant)
Glyfos, Renegade Victor, Credit + Banvel	300 + 120	- volunteer cereals, wild oats, green foxtail, volunteer canola (rapeseed), wild mustard, flixweed*, lamb's-quarters, lady's-thumb, stinkweed, kochia, Russian thistle, cow cockle, redroot pigweed**, wild buckwheat**	- This tank mixture is registered for **summer fallow use only**. - Weeds should be less than 15 cm tall and actively growing for best results. Use higher rate if weeds are beyond 8 cm tall. - *Glyfos, Renegade, Victor is applied at 405 mL/acre. - **Suppression only. See other tank mixtures for control option.
Glyfos, Renegade, Victor, Credit + Pardner	300 - 400 + 500	- volunteer cereals, green foxtail, volunteer canola (rapeseed), wild mustard, lady's-thumb, stinkweed, wild buckwheat*, redroot pigweed**, kochia**, wild oats*	- This tank mixture is registered for **summer fallow use only** and prior to wheat, oats and barley in minimum tillage systems. Weeds should be at least 15 cm tall and actively growing for best results. - Use higher rate if weeds are beyond 8 cm in height. - *Use Glyfos, Renegade, Victor at 400 mL/acre rate only for wild buckwheat control. - **400 mL suppression only. See other tank mixtures for control option.
Glyfos, Renegade, Victor, Credit + 2,4-D amine	300 - 400 + 485	- volunteer cereals, wild oats*, green foxtail*, volunteer canola (rapeseed), wild mustard, flixweed, redroot pigweed, lady's-thumb, stinkweed, kochia, lamb's-quarters, Russian thistle	- This tank mixture is registered for **summer fallow use only**. Weeds should be less than 15 cm tall and actively growing for best results. - Use higher rate if weeds are beyond 8 cm in height. - *Use Glyfos, Renegade, Victor at 400 mL/acre for wild oats and green foxtail control. - **Suppression only. See other tank mixtures for control option.

Perennial Weed Control

Weed	Application			Comments
	Growth stage	Rate (L/ac)	Water volume (L/ac)	
Quackgrass (control, light to moderate infestations)	3 - 4 green leaves or more	1	20 - 120	- Allow 3 or more days after treatment before tillage. - For higher water volumes (i.e., 60 - 120 L/ac), an approved surfactant must be added at 0.5 litres per 100 litres of clean water (0.5% V/V).
Quackgrass (long-term control, heavy infestations, high water volumes)	3 - 4 green leaves or more	1 - 2.8	20 - 120	- Allow 3 or more days after treatment before tillage. - Rates higher than 1 L/ac will provide more consistent long-term control, especially with heavier infestations and/or higher water volumes (i.e., 60 - 120 L/ac).
Canada thistle	Rosette stage (summer fallow)	1	20 - 40	- Allow 10 or more days after treatment before tillage.
Canada thistle	Bud stage or beyond	1.9 - 2.8	40 - 120	- Allow 5 or more days after treatment before tillage.
Field bindweed	Full bloom or beyond	1.9 - 2.8	40 - 120	- Allow 7 or more days after treatment before tillage.
Common milkweed	Bud to full bloom	4.9	40 - 120	- Allow 7 or more days after treatment before tillage. - Reduced control may occur after full bloom. - Milkweed may not be present in a correct stage, therefore, repeat treatment may be required.
Toadflax	Vegetative stage (summer fallow)	1	20 - 40	- Allow 7 or more days after treatment before tillage.
Foxtail barley	Seedling to heading	1 - 2	20 - 40	- Allow a minimum of 1 day after treatment before tillage or seeding. - Use higher rate for larger, more established plants, heavy infestations or if plants are stressed.

Preplant or preseed application in direct seeding systems (all crops): 500 - 750 mL/ac annual weeds up to 15 cm in height. Apply prior to seeding or after seeding but before crop emergence for control of emerged weeds in direct seeding systems. Ensure weeds are at the desired stage at time of application. This product does not provide pre-emergent weed control, and newly germinating weeds may be a problem in the crop.

Water volume: Handgun, high volume (coarse sprays only): 80 - 120 L/ac. Boom: 40 - 120 L/ac. Chemical fallow, reduced rates: 20 - 40 L/ac. Always use clean water, free of sediments.

Pressure: 275 kPa.

Nozzles: Flat fan nozzles for volumes 20 - 40 L/ac: flood jet type or flat fan for volumes above 40 L/ac.

Perennial Weed Control

[illegible]	Growth stage	Rate (L/ac)	Water volume (L/ac)	
Quackgrass (control, light to moderate infestations)	3 - 4 green leaves or more	1	20 - 120	- Allow 3 or more days after treatment before tillage. - For higher water volumes (i.e., 80 - 120 L/ac), an approved surfactant must be added at 0.5 litres per 100 litres of clean water (0.5% V/V).
Quackgrass (long-term control, heavy infestations, high water volumes)	3 - 4 green leaves or more	1 - 2.8	20 - 120	- Allow 3 or more days after treatment before tillage. - Rates higher than 1 L/ac will provide more consistent long-term control, especially with heavier infestations and/or higher water volumes (i.e., 80 - 120 L/ac).
Canada thistle	Rosette stage (summer fallow)	1	20 - 40	- Allow 10 or more days after treatment before tillage.
Canada thistle	Bud stage or beyond	1.9 - 2.8	40 - 120	- Allow 5 or more days after treatment before tillage.
Field bindweed	Full bloom or beyond	1.9 - 2.8	40 - 120	- Allow 7 or more days after treatment before tillage.
Common milkweed	Bud to full bloom	4.9	40 - 120	- Allow 7 or more days after treatment before tillage. - Reduced control may occur after full bloom. - Milkweed may not be present in a correct stage, therefore, repeat treatment may be required.
Toadflax	Vegetative stage (summer fallow)	1	20 - 40	- Allow 7 or more days after treatment before tillage.
Foxtail barley	Seedling to heading	1 - 2	20 - 40	- Allow a minimum of 1 day after treatment before tillage or seeding. - Use higher rate for larger, more established plants, heavy infestations or if plants are stressed.

Preplant or preseed application in direct seeding systems (all crops): 500 - 750 mL/ac annual weeds up to 15 cm in height. Apply prior to seeding or after seeding but before crop emergence for control of emerged weeds in direct seeding systems. Ensure weeds are at the desired stage at time of application. This product does not provide pre-emergent weed control, and newly germinating weeds may be a problem in the crop.

Water volume: Handgun, high volume (coarse sprays only): 80 - 120 L/ac. Boom: 40 - 120 L/ac. Chemical fallow, reduced rates: 20 - 40 L/ac. Always use clean water, free of sediments.

Pressure: 275 kPa.

Nozzles: Flat fan nozzles for volumes 20 - 40 L/ac: flood jet type or flat fan for volumes above 40 L/ac.

8. **Application Tips:** Tillage or mowing prior to application will reduce effectiveness on perennial weeds. Minimum (days) to wait before tillage after application: annual weeds (3); spring and fall quackgrass (3); Canada thistle bud stage (5), fall rosette stage (7 - 10); field bindweed, milkweed, other perennials (7). Before commencing tillage, allow at least 3 full days (72 hours) after application for quackgrass control and 5 - 7 days after application for thistles if applied other than at early bud stage.

   Quackgrass control:

   Spring and fall treatments in annual and forage cropping systems: Apply to actively growing quackgrass. Reduced control may result if rhizomes become dormant. This may occur when soil fertility is poor or land has not been tilled for several years.

   Application on forages should be followed by tillage and should be made when good growing conditions exist.

   Fall treatments should be applied 3 - 4 weeks after swathing to actively growing quackgrass.Quackgrass can be treated after mild frost provided there are 3 - 4 green leaves actively growing at the time of application. Do not apply after first damaging frost in the fall. Frost of -5°C is usually tolerated by new shoots. Frost damage is evident by the drying of new shoots shortly after frost.

   Allow 3 or more days after application before tillage.

   For best results on fall till ground, delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

   Canada thistle (fall rosette): Conduct summer fallow tillage as usual and perform last tillage operation between July 15 and August 1. Allow thistles to regrow for a minimum of 5 weeks until they are 15 cm in diameter and majority of them are in a rosette stage.

9. **How it Works:** A non-selective, systemic herbicide that moves from the foliage into the roots and kills the entire plant.
10. **Expected Results:** Wilting and yellowing of annuals occurs within 2 - 4 days; perennials require 7 - 10 days. Complete browning of above ground growth and deterioration of roots occurs. Cool or cloudy weather may slow activity.
11. **Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application.
12. **Movement in Soil:** The amount of glyphosate leaching is very low.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest treated areas until plants have turned brown and started to deteriorate.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (4,320). Eye irritant. Non-toxic to bees, birds and fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage not required.

Preharvest: Glyfos/Renegade/Victor/Credit

Application may be made prior to harvest for the control of quackgrass, Canada thistle, common milkweed, toadflax, dandelion, season-long control of perennial sow-thistle.

Crop: Wheat, barley (including malting barley), canola (rapeseed), dry beans, flax, lentils, peas and soyabean.

Rate: 1 L/ac. Do not apply to crop grown for seed.

With: Ground equipment. Do not apply by air.

Crop timing: Apply when average seed moisture content is at or below 30%. Accurate measurement of seed moisture content must be made before application. This stage typically occurs 7 - 14 days before harvest. For forage crops, apply at 1 - 2 L/ac 3 - 7 days prior to the last cut before rotation or forage renovation. Consult the table below for visual indicator of this stage in each crop.

Guidelines for timing of pre-harvest applications

Crops	Per cent seed moisture	Visual indicators
wheat, barley	less than 30	Hard dough stage: a thumbnail impression remains on the seed
canola	less than 30	Pods are yellow to green and most seeds are yellow to brown
dry beans	less than 30	Stems are green to brown in color; pods are mature (yellow to brown in color); 80% - 90% leaf drop (original leaves)
flax (incl. linola)	less than 30	Majority 75% - 80% of pods are brown
lentils	less than 30	Lowermost pods (bottom 15%) are brown and seeds rattle
peas	less than 30	Majority 75% - 80% of pods are brown
soybeans	less than 30	Stems are green to brown in color and pod tissue is brown and dry in appearance (80 - 90% leaf drop)
forages	not applicable	Normal stage for forage harvesting

Weeds controlled: Quackgrass, Canada thistle, common milkweed, toadflax, dandelion, perennial sow-thistle (season-long) and most of the annual weeds.

Weed stage: For best weed control results, apply when quackgrass is actively growing and at least 4 - 5 green leaves. Canada thistle and perennial sow-thistle should be actively growing and at or beyond the bud stage for best results.

Application tip: This treatment may also provide harvest management benefits by drying down crop and vegetative crop growth and late tillering that may interfere with harvest operations. Apply only during the period 7 - 14 days (or 3 - 7 days for forage applications) before harvest to ensure best weed control and to maximize harvest-aid benefits. Earlier application may reduce crop yield and/or quality and may lead to excess glyphosate residues in the crop. Extremely cool, wet and/or cloudy weather between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry down and harvest date.

Caution:

Do not apply to any crops if grown for seed.

Consult malt buyers before using preharvest on malt barley. All portions of the treated crops may be fed to livestock.

Gramoxone *(paraquat)*

Group 22

Manufacturer: **Zeneca Agro**

DANGER POISON

1. **Formulations:** Solution; 200 g/L; 1, 4 x 5 L pack.
2. **Registered Mixes:** Lexone, Lorox, Patoran, Sencor and 2,4-D.

   Chemical mowing of non-crop areas: May be tank mixed with certain soil sterilants where immediate top kill and long-term sterilization are required.
3. **Crops:** Asparagus, non-crop areas, potatoes, shelterbelts, stale seedbed (vegetables, field crops), sugar beets.
4. **Weeds Controlled:** All top growth. Generally kills annuals in 1 application. Repeat applications may be needed on perennials.
5. **Weeds Suppressed:** Most perennial weeds.

Crop timing: Apply when average seed moisture content is at or below 30%. Accurate measurement of seed moisture content must be made before application. This stage typically occurs 7 - 14 days before harvest. For forage crops, apply at 1 - 2 L/ac 3 - 7 days prior to the last cut before rotation or forage renovation. Consult the table below for visual indicator of this stage in each crop.

Guidelines for timing of pre-harvest applications

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forages	not applicable	Normal stage for forage harvesting

Weeds controlled: Quackgrass, Canada thistle, common milkweed, toadflax, dandelion, perennial sow-thistle (season-long) and most of the annual weeds.

Weed stage: For best weed control results, apply when quackgrass is actively growing and at least 4 - 5 green leaves. Canada thistle and perennial sow-thistle should be actively growing and at or beyond the bud stage for best results.

Application tip: This treatment may also provide harvest management benefits by drying down crop and vegetative crop growth and late tillering that may interfere with harvest operations. Apply only during the period 7 - 14 days (or 3 - 7 days for forage applications) before harvest to ensure best weed control and to maximize harvest-aid benefits. Earlier application may reduce crop yield and/or quality and may lead to excess glyphosate residues in the crop. Extremely cool, wet and/or cloudy weather between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry down and harvest date.

Caution:

Do not apply to any crops if grown for seed.

Consult malt buyers before using preharvest on malt barley. All portions of the treated crops may be fed to livestock.

Gramoxone *(paraquat)*

Group 22

Manufacturer: **Zeneca Agro**

DANGER POISON

1. **Formulations:** Solution; 200 g/L: 1, 4 x 5 L pack.
2. **Registered Mixes:** Lexone, Lorox, Patoran, Sencor and 2,4-D.

   Chemical mowing of non-crop areas: May be tank mixed with certain soil sterilants where immediate top kill and long-term sterilization are required.
3. **Crops:** Asparagus, non-crop areas, potatoes, shelterbelts, stale seedbed (vegetables, field crops), sugar beets.
4. **Weeds Controlled:** All top growth. Generally kills annuals in 1 application. Repeat applications may be needed on perennials.
5. **Weeds Suppressed:** Most perennial weeds.

Gramoxone (cont'd)

6. **When Used:** Prior to crop emergence but soon after weeds emerge.

   Potatoes: Apply up to ground crack only for Netted Gem and Cherokee. Other varieties apply up until the first potato tops are 5 - 8 cm. Do not apply to emerged potato foliage in the evening, when potatoes are under moisture stress due to extremely dry soil conditions or to early potatoes.

   Stale seedbed: Do not apply later than 3 days before crop emergence.

7. **How to Apply:**

   With: Ground equipment only. Do not use mist blowers.

   Rate:

   Chemical mowing: 1.1 L in 220 - 445 L/ac of water.

   Non-crop areas: 2.2 - 4.5 L in 220 - 445 L/ac of water.

   Potatoes: Quackgrass, annual grasses and broadleaf weeds: 1 - 1.75 L in 120 - 220 L/ac of water; emerged seedlings thereof: only 610 mL in 120 - 220 L/ac of water. **Note:** Application to exposed or emerged potato foliage will cause temporary injury and chlorosis. Use of poor or diseased seed and cut seed with 1 eye will make potatoes more susceptible to injury by post-emergence sprays. Will not control weeds that germinate after treatment.

   Shelterbelts: 2.2 L in 445 L of water/ac or 75 mL in 10 L of water/100 m^2. 550 mL of this mixture will treat an area 1.75 min diameter around a tree. Keep chemical off the tree foliage.

   Stale seedbed technique (vegetables, field crops): Beans (all types), beets, carrots, cole crops, corn, cucumbers, onions, peas, potatoes, soybeans, turnips. Prepare a seedbed at least 2 - 4 weeks before seeding to stimulate weed growth. Seed with minimum soil disturbance. Burn-off of emerged weeds: 1.1 - 2.2 L in 120 - 445 L of water/ac before or after seeding. Weeds above 5 cm tall: 2.2 L/ac.

   Water volume: 120 - 445 L/ac. Thoroughly wet all foliage. For dense weed growth, use the greater volume of water.

   Pressure: 300 kPa.

   Nozzles: Flat fan recommended.

   Incorporation: Not applicable.

8. **Application Tips:** Use only clean water to avoid reduction in effectiveness. Use high volume, low pressure type spraying equipment to thoroughly cover foliage. Special equipment is necessary to shield some row crops from spray. Applications on cloudy days or just prior to or during periods of darkness will generally increase the treatment effectiveness. Wash equipment thoroughly after spraying – use a wetting agent (Agral 90 at 60 mL/100 L of water), flush and spray out, then thoroughly rinse with clean water. Fill with clean water and leave overnight, then spray out.

9. **How it Works:** Gramoxone is a contact type herbicide; therefore, good spray coverage is essential. It is absorbed by all leaf and stem surfaces and is non-systemic. It interferes with photosynthesis.

10. **Expected Results:** Provides immediate, fast and virtually complete annual weed kill from 1 application. Repeat applications may be necessary for perennial weeds. Yellowing occurs within a few hours and desiccation of the plant continues rapidly until death.

11. **Effects of Rainfall:** Rain prior to spray solution drying on plant or muddy water will reduce effectiveness of the chemical. Once spray solution has dried on plant tissue, rain will not reduce effectiveness.

12. **Movement in Soil:** Binds to the soil and becomes biologically unavailable. No residual effect.

13. **Grazing and Cropping Restrictions:**

    Drift: Prevent drift onto crops, ornamentals, lawns, grazing areas or other desirable areas.

    Grazing restrictions: Not applicable.

    Crop use after hail: No restriction.

    Succeeding crops: No restriction.

14. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = paraquat ion (120 - 150). Symptoms of acute poisoning may occur. Intake can cause heart, liver and kidney damage and can be fatal. It can be absorbed through the skin.

15. **Precautions, First Aid: Keep out of reach of children and animals.** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage preferred. Will crystallize if frozen. **Never** transfer to other containers.

Gramoxone PDQ *(paraquat + diquat)*

Group 22

Manufacturer: **Zeneca Agro**

WARNING POISON

1. **Formulations:** Liquid; paraquat 132 g/L + diquat 66 g/L; 10 L.
2. **Registered Mixes:** None.
3. **Crops:** Barley, canaryseed, canola, corn, dry common beans, field peas, flax (including low linolenic acid varieties), lentils, mustard, oats, potatoes, rye, soybeans, sunflowers, triticale, wheat.
4. **Weeds Controlled:** Annual grass and broadleaf weed seedlings.
5. **Weeds Suppressed:** Winter annual weeds, perennial grass and broadleaf weeds.
6. **When Used:** Apply before seeding or after seeding, but prior to crop emergence to control emerged weeds in conventional and minimum tillage production systems and when using stale seedbed production techniques.
7. **How to Apply:**

   With: Ground equipment only. Do not apply through mist blowers. Do not apply by aircraft.

   Rate:
   For control of annual grass and broadleaf weed seedlings: 0.8 - 1.6 L/ac.
   Minimum 1.2 L/ac for control of winter annual weeds or when weed growth is dense and weeds are greater than 10 cm in height. (also increase volume of water).

   Water volume: Apply in at least 40 L/acre. Thoroughly wet all foliage. For dense weed growth, use higher volume of water.
8. **Application Tips:** Use clean water for spraying. Muddy water will reduce effectiveness. Dust disturbed by equipment tires or on plant leaves will reduce effectiveness. Applications made on cloudy days, during dull sunlight or just prior to or during periods of darkness will generally increase effectiveness. Avoid application or drift onto crops, ornamental plants, lawns, grazing areas or other desirable growth. **Not to be used as a desiccant.**
9. **How it Works:** Gramoxone PDQ is a contact type herbicide; therefore, thorough spray coverage is essential. Absorbed by all leaf and stem surfaces, non systemic. Interferes with photosynthesis.
10. **Expected Results:** Fast and complete top kill of all annual weeds. Yellowing starts within a few hours of applications. No systemic activity therefore will only control the top growth of perennial plants.
11. **Effects of Rainfall:** Rain falling shortly after application normally will not reduce the effectiveness of the treatment.
12. **Movement in Soil:** Inactivated on contact with the soil, therefore has no residual effect.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest crops within 30 days of treatment.
14. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (661).

15. **Precautions, First Aid:** Wear long-sleeve chemical resistant gloves, goggles or a face shield, a long-sleeve shirt and long pants and chemical resistant apron when handling the concentrate. Avoid contact with spray solution. Do not re-enter treated areas within 24 hours.

    First Aid: If swallowed, induce vomiting if not already occurring. **Get to nearest hospital fast. This is essential.** If delay unavoidable, administer fluids and induce further vomiting. Contact a poison control centre. **If in eyes**, flush with clean water for 15 minutes and get medical attention even if no irritation arises. Call a physician or contact a poison control centre. **If on skin**, wash thoroughly with water. Remove contaminated clothing immediately. Wash separately from household laundry before re-use. **If irritation develops**, contact a physician or contact a poison control centre.

16. **Storage:** Do not freeze. If crystallization occurs because of storage below 0°C, warm to room temperature and agitate until reconstituted.

Harmony Total *(clodinafop-propargyl + thifensulfuron methyl + tribenuron methyl)*

Group 1,2

Manufacturer **DuPont Canada Inc**

CAUTION POISON

1. **Formulations:**
    1. Refine Extra (Dry flowable): 50% thifensulfuron methyl, 25% tribenuron methyl; Toss-N-Go 320 grams, (4 x 80 grams) water soluble pouches.
    2. Horizon Emulsifiable Concentrate: 240 g/L; 1 x 3.7 L + 2 x 6.4 L Score.
2. **Registered Mixes:** MCPA Ester (250 - 340 mL/ac).
3. **Crops:** All types of spring and durum wheat.
4. **Weeds Controlled:**

    chickweed (8.5)
    corn spurry (8.8)
    cow cockle (8.7)
    green foxtail
    green smartweed
    hemp-nettle (8.4)
    kochia (8.5)
    lady's-thumb
    lamb's-quarters (8.6)
    redroot pigweed (8.4)
    Russian thistle (7.9)
    shepherd's-purse (8.2)
    stinkweed (8.6)
    tartary buckwheat (8.3)
    volunteer rapeseed (8.6) (excluding smart-trait)
    wild buckwheat (7.7)
    wild mustard (8.6)
    wild oats

5. **Weeds Suppressed:** Canada thistle (7.1), sow-thistle, round-leaved mallow (6.4), cleavers (6.7), scentless chamomile (6.9), stork's-bill (6.7), toadflax [less then 15 cm tall (7,1)].
6. **When Used:**

    Crop: Apply post-emergence to crop from 2 leaf to prior to emergence of the 4th tiller.

    Weeds:

    Wild oats: 1 - 6 true leaves on the main stem and prior to emergence of the 4th tiller.

    Green foxtail: 1 - 5 true leaves on the main stem. For optimum control, apply before tillering and while green foxtail is actively growing.

    Broadleaf weeds: Apply to young, actively growing broadleaf weeds before the canopy closes. Weeds emerging after treatment may not be controlled.

    Wild buckwheat: Apply to actively growing wild buckwheat in the 1 - 3 leaf stage.

    Cleavers: Apply at 1 - 3 whorl stage.

Canada thistle, sow-thistle: Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are larger than 15 cm tall before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistles will not be controlled.

Chickweed: Apply when the chickweed is small (1 - 6 leaf) and actively growing, but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled.

Round-leaved mallow: Apply to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height). Harmony Total will keep mallow stunted but may not reduce the overall populations.

Toadflax: Apply when toadflax is no taller than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application.

7. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: Horizon: 95 mL/ac, Refine Extra: 8 g/ac, Score 0.8% v/v of spray solution.

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: Use flat fan nozzles. Use 50 mesh screens or larger. Use only metal or nylon filters.

Mixing instructions:

1. To clean spray tank, fill 1/4 to 1/3 with clean water. Start agitation or bypass system.
2. Add Refine Extra first to the spray tank and agitate for 2 - 3 minutes.
3. Add required amount of Horizon.
4. Agitate for 2 - 3 minutes.
5. Add required amount of Score Adjuvant.
6. Agitate for 1 - 2 minutes before adding remainder of water.
7. After any break in spraying operations, agitate thoroughly before spraying again.
8. Use the spray suspension as soon it is prepared.
9. If an oil film starts to build up in the tank, drain tank and then clean with a detergent.

Sprayer clean-up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Harmony Total when cleaning.

1. Drain and flush tank, boom and hoses with clean water for a minimum of 10 minutes. Visually inspect tank to ensure removal of all visible residues of Harmony Total. If necessary, repeat step 1.
2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum of 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes with agitation. Again, flush the hoses, booms and nozzles with the cleaning solution and drain the tank.
3. Remove nozzles and screens, and clean separately in bucket containing cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. Application Tips:

Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Harmony Total may be reduced if it remains in the tank for more than 24 hours. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

9. How it Works:

Harmony Total is absorbed by the foliage and rapidly translocated to the growing points. Inhibits cell elongation in broadleaf weeds. Thorough coverage of the plants is essential for consistent control.

10. Expected Results:

Broadleaf weed growth stops immediately. Discoloration of dying weeds may be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species. Grassy weeds – depending on the species, growing conditions and crop competition – leaves and growing points turn yellow within 1 - 3 weeks after application. Further colour changes and loss of vigor will be observed followed by a browning, and complete control occurs 3 - 5 weeks after application. **Poor results may be expected if** there is improper mixing, timing or coverage, or when weeds are under drought stress.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

REMARQUE IMPORTANTE CONCERNANT LES PAGES QUI SUIVENT

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11. **Effects of Rainfall:** Rainfall within 4 hours of application may lessen degree of weed control.
12. **Movement in Soil:** Harmony Total moves little in the soil and disappears from the soil quickly.
13. **Grazing and Cropping Restrictions:** Wheat may be grazed 7 days after the application of Harmony Total. Do not treat wheat underseeded to forages. Do not plant to any crop until 2 months after application. Do not exceed a total of 8 g/ac of Refine Extra per crop year. Pre-harvest interval: 60 days.
14. **Toxicity:** Acute oral LD_{50} (rats) 2276 mg/kg; Acute dermal LD_{50} (rats) 4,000 mg/kg.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store product in closed, original container in a cool, dry, well-ventilated room.
17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled. To delay selection of resistant populations, rotate the use of Group 1 and Group 2 products with other products effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Herbicide 273 *(endothall)*

Manufacturer: **United Agri Products**

DANGER POISON

1. **Formulations:** Herbicide 273 is a 360 g/L liquid available in 18.2 L containers.
2. **Registered Mixes:** Betamix, Betanex.

   Mixing instructions: Fill spray tank with 1/2 amount of water. With agitator running, add Herbicide 273 followed by other herbicide for tank mix. Add remaining water.
3. **Crops:** Sugar beet.
4. **Weeds Controlled:**

   Pre-emergent with high moisture: barnyard grass, green foxtail, redroot pigweed.

   Post-emergence application: lady's-thumb, wild buckwheat.
5. **Weeds Suppressed:** None.
6. **When Used:** Post-emergence: 4 - 6 leaf stage of the crop.
7. **How to Apply:**

   With: Ground equipment.

   Rate:

   1. Herbicide 273 can be applied alone on a band.

[illegible]	[illegible]
13	0.21 - 0.45
15	0.24 - 0.51
18	0.29 - 0.62

– Use lower rate on light, sandy soils.

2. Herbicide 273 applied as a tank mix with Betamix or Betanex.

[illegible]	[illegible]	[illegible]
13	0.14 - 0.31	0.65
15	0.16 - 0.35	0.75
18	0.19 - 0.42	0.90

– Use lower rates on light, sandy soils.

3. **Broadcast treatment:** 0.9 - 1.9 L/ac in 36 - 110 L of water.
4. Tank mixes (post-emergence only, 56 cm row spacing band).

[illegible]	[illegible]	[illegible]	[illegible]
Herbicide 273	0.6 - 1.3	15	0.1 - 0.3
		20	0.2 - 0.4
		25	0.2 - 0.6
Betamix	2.8	15	0.8
		20	1.1
		25	1.3
Betanex	2.8	15	0.8
		20	1.1
		25	1.8

8. **Application Tips:** As a post-emergence treatment, do not apply later than 80 days after emergence. Some temporary marginal leaf burn may occur under adverse conditions, but recovery is normally rapid. For best results, apply when average temperature is above 20°C.
9. **How it Works:** No information available.
10. **Expected Results:** No information available.
11. **Effects of Rainfall:** No information available.
12. **Movement in Soil:** No information available.
13. **Grazing and Cropping Restrictions:** Will not interfere with normal crop rotation.

    Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.
14. **Toxicity:** Acute oral LD_{50} (rats) 125 mg/kg. Acute dermal LD_{50} (rabbits) 10,000 mg/kg.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Keep from freezing.

Harmony Total (cont'd)

11. **Effects of Rainfall:** Rainfall within 4 hours of application may lessen degree of weed control.
12. **Movement in Soil:** Harmony Total moves little in the soil and disappears from the soil quickly.
13. **Grazing and Cropping Restrictions:** Wheat may be grazed 7 days after the application of Harmony Total. Do not treat wheat underseeded to forages. Do not plant to any crop until 2 months after application. Do not exceed a total of 8 g/ac of Refine Extra per crop year. Pre-harvest interval: 60 days.
14. **Toxicity:** Acute oral LD_{50} (rats) 2276 mg/kg; Acute dermal LD_{50} (rats) 4,000 mg/kg.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store product in closed, original container in a cool, dry, well-ventilated room.
17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled. To delay selection of resistant populations, rotate the use of Group 1 and Group 2 products with other products effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Herbicide 273 *(endothall)*

Manufacturer: **United Agri Products**

DANGER POISON

1. **Formulations:** Herbicide 273 is a 360 g/L liquid available in 18.2 L containers.
2. **Registered Mixes:** Betamix, Betanex.

   Mixing instructions: Fill spray tank with 1/2 amount of water. With agitator running, add Herbicide 273 followed by other herbicide for tank mix. Add remaining water.
3. **Crops:** Sugar beet.
4. **Weeds Controlled:**

   Pre-emergent with high moisture: barnyard grass, green foxtail, redroot pigweed.

   Post-emergence application: lady's-thumb, wild buckwheat.
5. **Weeds Suppressed:** None.
6. **When Used:** Post-emergence: 4 - 6 leaf stage of the crop.
7. **How to Apply:**

   With: Ground equipment.

   Rate:

   1. Herbicide 273 can be applied alone on a band.

Band width (cm)	Litres/ac
13	0.21 - 0.45
15	0.24 - 0.51
18	0.29 - 0.62

– Use lower rate on light, sandy soils.

2. Herbicide 273 applied as a tank mix with Betamix or Betanex.

Band width (cm)	Litres/ac	
	Herbicide 273	Betamix or Betanex
13	0.14 - 0.31	0.65
15	0.16 - 0.35	0.75
18	0.19 - 0.42	0.90

– Use lower rates on light, sandy soils.

3. **Broadcast treatment:** 0.9 - 1.9 L/ac in 36 - 110 L of water.
4. Tank mixes (post-emergence only, 56 cm row spacing band).

Broadcast	Band (L/ac)	Width (cm)	Litres/ac
Herbicide 273	0.6 - 1.3	15	0.1 - 0.3
		20	0.2 - 0.4
		25	0.2 - 0.6
Betamix	2.8	15	0.8
		20	1.1
		25	1.3
Betanex	2.8	15	0.8
		20	1.1
		25	1.8

8. **Application Tips:** As a post-emergence treatment, do not apply later than 80 days after emergence. Some temporary marginal leaf burn may occur under adverse conditions, but recovery is normally rapid. For best results, apply when average temperature is above 20°C.
9. **How it Works:** No information available.
10. **Expected Results:** No information available.
11. **Effects of Rainfall:** No information available.
12. **Movement in Soil:** No information available.
13. **Grazing and Cropping Restrictions:** Will not interfere with normal crop rotation.

    Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.
14. **Toxicity:** Acute oral LD_{50} (rats) 125 mg/kg. Acute dermal LD_{50} (rabbits) 10,000 mg/kg.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Keep from freezing.

Heritage 5G/Advance 10G

(trifluralin)

Wheat – Brown soil zones only

Group 3

Manufacturer: **Dow AgroSciences Canada Inc.**

1. **Formulations:** Heritage Granular; 5%; 25 kg bag and 725 kg returnable bulk bag. Advance Granular; 10%; 22.7 kg bag and 454 kg returnable bulk bag.
2. **Registered Mixes:** None.
3. **Crops:** Wheat (durum, spring)(8.6).

   Underseeding: Not recommended.
4. **Weeds Controlled:**

   - barnyard grass (8.3)
   - cow cockle (9.0)
   - green foxtail (8.1)
   - lamb's-quarters (8.0)
   - Persian darnel
   - redroot pigweed (8.2)
   - Russian thistle (7.9)
   - wild buckwheat (8.3)
   - wild oats (7.5)

   Crop year: Green foxtail, lamb's-quarters.
5. **Weeds Suppressed:**

   Crop year: Wild buckwheat, wild oats.
6. **When Used:** Apply to summerfallow in May, June and July for weed control during both years of a summerfallow-wheat rotation. Maximum benefit comes when applied as early as possible in the fallow year. **Also see Special Use below.**
7. **How to Apply:**

   With: Ground equipment with granular applicator.

   Rate:

		May	June (kg/ac)	July
1 - 3% Organic matter	– Heritage	7.7	6.5	5.3
	– Advance 10G	3.8	3.2	2.6
4 - 8% Organic matter	– Heritage	8.9	7.7	6.5
	– Advance 10G	4.5	3.8	3.2

Brown soil zones only.

Incorporation: If green growth prevents proper mixing, it must be destroyed before application. Apply over standing or pre-worked stubble, provided straw is chopped and evenly distributed. Incorporate within 24 hours of application to 5 - 8 cm with cultivator (field or deep tillage) at 10 - 13 km/h or disc at 7 - 10 km/h. Second incorporation at the same depth and right angles to first. Repeat when necessary to control resistant weeds in fallow year. Cultivation with a rodweeder or shallow tillage cultivator may be required. Do not cultivate when soil is crusted, lumpy or too wet for good mixing action. Working deeper than 8 cm can result in erratic weed control and crop injury.

Heritage 5G/Advance 10G

(trifluralin)

Wheat – Brown soil zones only

Group 3

Manufacturer: Dow AgroSciences Canada Inc.

1. **Formulations:** Heritage Granular; 5%; 25 kg bag and 725 kg returnable bulk bag. Advance Granular; 10%; 22.7 kg bag and 454 kg returnable bulk bag.
2. **Registered Mixes:** None.
3. **Crops:** Wheat (durum, spring)(8.6).

   Underseeding: Not recommended.
4. **Weeds Controlled:**

barnyard grass (8.3)	lamb's-quarters (8.0)	Russian thistle (7.9)
cow cockle (9.0)	Persian darnel	wild buckwheat (8.3)
green foxtail (8.1)	redroot pigweed (8.2)	wild oats (7.5)

   Crop year: Green foxtail, lamb's-quarters.
5. **Weeds Suppressed:**

   Crop year: Wild buckwheat, wild oats.
6. **When Used:** Apply to summerfallow in May, June and July for weed control during both years of a summerfallow-wheat rotation. Maximum benefit comes when applied as early as possible in the fallow year. **Also see Special Use below.**
7. **How to Apply:**

   With: Ground equipment with granular applicator.

   Rate:

		May	June (higher)	July
1 - 3% Organic matter	– Heritage	7.7	6.5	5.3
	– Advance 10G	3.8	3.2	2.6
4 - 8% Organic matter	– Heritage	8.9	7.7	6.5
	– Advance 10G	4.5	3.8	3.2

Brown soil zones only.

Incorporation: If green growth prevents proper mixing, it must be destroyed before application. Apply over standing or pre-worked stubble, provided straw is chopped and evenly distributed. Incorporate within 24 hours of application to 5 - 8 cm with cultivator (field or deep tillage) at 10 - 13 km/h or disc at 7 - 10 km/h. Second incorporation at the same depth and right angles to first. Repeat when necessary to control resistant weeds in fallow year. Cultivation with a rodweeder or shallow tillage cultivator may be required. Do not cultivate when soil is crusted, lumpy or too wet for good mixing action. Working deeper than 8 cm can result in erratic weed control and crop injury.

8. **Application Tips:** Do not apply on soils subject to prolonged flooding, sandy soils with less than 1% organic matter, soils with more than 8% organic matter or soils in poor working condition. Application to severly eroded knolls may result in reduced crop stands. In the fall, prior to application, spread straw evenly over field and leave stubble standing to trap snow. For maximum effectiveness, apply in May. After filling granular applicator, close lid quickly to avoid exposure to direct sunlight. In crop year, after application and when soil is warm enough for good germination, prepare seedbed with field cultivator set at 5 cm deep. Seed into a weed-free seedbed, 3 - 6 cm deep, using double disc or hoe drill. Separate spring tillage may not be necessary with a discer or airseeder. Pack or harrow after seeding. Drought conditions in fallow year, prior to seeding, may result in higher carry-over of Heritage at seeding time. To reduce possible injury by carry-over, seeding to the correct depth (3 - 6 cm) and into a warm, moist seedbed is critical. Use quality seed and agronomic practices that promote good, rapid, even crop germination and emergence for each crop seeded. Drought conditions in fallow year, prior to seeding, may result in higher carry-over of Heritage at seeding time.

9. **How it Works:** Seedlings are killed during germination by inhibited cell division at active growing points. This activity results in puffy, brittle, slow growing shoots and swollen brittle root tips. Established weeds are not controlled.

10. **Expected Results:**

    Weeds: After first incorporation, susceptible weeds are partially controlled. After second operation, susceptible weeds are controlled before emergence.

    Crop: No injury to wheat, after summerfallow. Over-application caused by overlapping, improper calibration, non-uniform application, etc. may reduce crop stand, delay development or reduce yields.

11. **Effects of Rainfall:** No effect once incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (10,000). Non-toxic to bees. Very toxic to fish. Large amounts of Heritage can be tolerated by fish in runoff or muddy water because it binds to suspended soil. Intake can cause heart, liver and kidney damage. A small amount of vomited liquid inhaled can be fatal.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in areas not exposed to high temperatures, prolonged direct sunlight or moisture.

17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Heritage, Triflurex, Rival, Trifluralin 10G/400 and Fortress will not control trifluralin-tolerant green foxtail. To delay selection or reduce the spread of trifluralin-tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin-tolerant green foxtail.

    Special use: Wheat [durum, spring (including semi-dwarf)] – **Fall application only. (September 1 to soil freeze-up).**

    Weeds controlled: Green foxtail.

    Incorporation: (as above) First incorporation within 24 hours of application, 5 - 8 cm deep. Second incorporation at same depth and right angles to first, in the fall at least 3 days later or in the spring during seedbed preparation.

    Application tip: Do not apply Heritage on stubble in the fall if the crop harvested in the current calendar year was treated with either a trifluralin product or Edge (ethalfluralin). This condition includes application made in the previous year.

    Rate: Heritage: 4.5 kg/ac. Advance 10G: 2.25 kg/ac.

Hoe-Grass II *(diclofop-methyl + bromoxynil)*

Group 1,6

Manufacturer : **Aventis Crop Science**

CAUTION POISON

1. **Formulations:** Emulsifiable Liquid; 230 g/L diclofop-methyl + 80 g/L bromoxynil; 20 L, 110L, 400L containers.
2. **Registered Mixes:** Decis: barley (except Betzes, Klages), flax, wheat. MCPA (Amine or Ester) **(only 28 mL/ac)**: barley (except Betzes, Klages), spring rye, triticale, wheat.

   Caution: Do not exceed, under any circumstances, the recommended amount of MCPA as a severe reduction in grassy weed control will result.
3. **Crops**: Barley (8.4)(except Betzes, Klages), flax (7.6), rye (spring) (9.0), triticale (9.0), wheat [durum (8.8), spring (8.7)].

   Seedling grasses (seed production only): Bromegrass; fescue, creeping red; ryegrass, Russian wild; wheatgrass (crested intermediate).

   Underseeding: Do not treat crops underseeded to legumes.
4. **Weeds Controlled**:

   barnyard grass (9.0)
   common groundsel (9.0)
   cow cockle (7.9)
   green foxtail (7.4)
   green smartweed (8.8)
   knawel
   kochia (8.2)
   lady's-thumb
   lamb's-quarters (7.0)
   night-flowering catchfly (8.8)
   Persian darnel (6.9)
   redroot pigweed (7.2)
   Russian thistle (8.2)
   scentless chamomile (8.7)
   stinkweed (8.2)
   tartary buckwheat (7.2)
   volunteer corn (8.4)
   wild buckwheat (8.0)
   wild mustard (8.3)
   wild oats (7.4)
   yellow foxtail
5. **Weeds Suppressed**: None.
6. **When Used:**

   Weeds: Barnyard grass, foxtail, wild oats: 1 - 4 leaf. Persian darnel: 1 - 3 leaf. Volunteer corn: 15 - 25 cm. Broadleaf weeds: seedling – early 4 leaf. Russian thistle: seedling – 5 cm tall.

   Crops:

   Barley (except Betzes, Klages): 1 - 4 leaf and prior to tillering. Application beyond the 4 leaf stage or after tillering will result in crop damage.

   Flax: 5 - 10 cm in height. During periods of stress [for example, very hot (28°C or 82°F)] or high humidity, flax may show leaf burn, retarded growth and a slight maturity delay. Avoid spraying flax under these conditions. Early evening spraying has been shown to be best.

   Wheat: No leaf stage restriction.

   Grasses: 2 - 5 leaf stage.
7. **How to Apply**:

   With: Ground equipment only. Do not apply by air.

   Rate: 1.4 L/ac.

   Water volume: 45 L/ac.

   Pressure: 275 kPa.

   Nozzles: Only flat fan nozzles recommended.

8. **Application Tips:** For best results and maximum yield enhancement, apply when majority of weeds are in the 2 - 3 leaf stage. During periods of stress, plants are not actively growing. When daytime temperatures are very hot (28°C or 82°F) and/or conditions are very dry and/or there is low humidity, plants are under stress. Application of Hoe-Grass during these periods may result in substantially reduced control. Under these conditions, yellow blotches may appear on crop leaves. These blotches will be rapidly outgrown and will not affect maturity or yield. Good spray coverage and penetration may be difficult if weed populations are extremely high. Apply the spray at a forward angle of 45° and ensure that weeds are young and actively growing. Hoe-Grass II must be applied at least 4 days before the use of any other herbicide to eliminate a reduction of control.

9. **How it Works:** Diclofop-methyl possesses contact as well as systemic action. Uptake is primarily through the leaves. The site of action is the growing point. Bromoxynil is primarily a contact herbicide with limited translocation in susceptible annual broadleaf weeds.

10. **Expected Results:** Yellowing of susceptible plants is visible within 2 - 4 days. New leaf growth exhibits light chlorosis which deepens, and browning develops within 10 - 14 days of application. Photosynthesis and growth are inhibited and uptake of water and nutrients ceases. Lack of adequate crown root development is one of the most distinguishable features of diclofop-methyl activity. Bromoxynil activity is evident within 24 hours as necrotic spots appear on the leaves of susceptible broadleaf weeds. This damage spreads rapidly until the plants ultimately die. Chlorosis may develop in the untreated leaves of these susceptible weeds even though very little movement of the bromoxynil occurs.

    Precautions:

    Barley: Under certain environmental conditions, yellow blotches may appear on the barley leaves. These blotches will be rapidly outgrown and will not affect maturity or yield.

11. **Effects of Rainfall:** Rainfall within 1 hour will decrease activity.

12. **Movement in Soil:** Some movement may occur if sufficient moisture is present.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields prior to harvest.

    Drift: Avoid treatment near susceptible crops.

    Succeeding crops: No restriction.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (2,350). Eye irritant. Toxic to fish. A small amount of vomited liquid inhaled can be fatal. May cause burns to the skin and eyes.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Do not store below freezing. If stored for 1 year or longer, shake well before using.

17. **Resistance Management:** Populations of green foxtail and wild oats tolerant to diclofop-methyl have developed in a number of fields in Western Canada that have had a long history of repeated diclofop-methyl use. To delay selection or reduce the spread of diclofop-methyl tolerant green foxtail and wild oats, avoid use of Hoegrass 284 and Hoegrass II repeatedly in the same field.

M121

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Hoe-Grass 284 *(diclofop-methyl)*

Group 1

Manufacturer: **Aventis Crop Science**

DANGER CORROSIVE

1. **Formulations:** Emulsifiable Liquid; 284 g/L; 20 L, 110 L, 400 L containers.
2. **Registered Mixes:** Lontrel (227 mL/ac only)(canola), Pardner [barley*, flax, wheat (durum, spring)], Decis [barley*, canola, flax, mustard, potatoes, wheat (durum, spring, winter)].

   Note: *Barley (except Betzes or Klages).

   Mixing restrictions: Mixing with any broadleaf herbicide other than those registered on the Hoe-Grass 284 label will result in a reduction of grassy weed control.
3. **Crops:**

- barley (8.2) (except Betzes, Klages)
- canola (8.9)
- carrots
- dry common beans (8.8) (only black, pinto, white)
- dry bulb onion (8.6)
- dry bulb wheat (8.5)
- durum wheat (8.9)
- fababeans (9.0)
- fall rye (9.0)
- field peas (9.0)
- flax (8.9)
- lentils (8.4)
- potatoes (8.7)
- processing peas (9.0)
- snap beans
- soybeans (8.8)
- spring rye (8.7)
- sugar beets (8.5)
- sunflowers (8.6) (except Corona)
- tame buckwheat (8.6)
- tame mustard (8.9)
- triticale (8.5)
- winter wheat (8.9)

Forages, only in year of establishment

- aflalfa (8.5)
- alsike clover**
- bromegrass (7.5)
- creeping red fescue (7.9)
- crested wheatgrass (7.3)
- intermediate wheatgrass
- red cover (8.0)
- Russian wild ryegrass (7.6)
- sainfoin**
- sweet clover (8.0)

** Seedling legumes for seed production only.

4. **Weeds Controlled**: Wild oats (7.7), foxtail [green (7.6), yellow], barnyard grass (8.0), Persian darnel (6.8), volunteer corn (8.4).
5. **Weeds Suppressed**: None.
6. **When Used:**

   Weeds: Barnyard grass, foxtail, wild oats: 1 - 4 leaf. Persian darnel: 1 - 3 leaf. Volunteer corn: 15 - 25 cm.

   Crops:

   Barley: 1 - 4 leaf, prior to tillering.

   Forages: Only in year of establishment; cannot use for food or feed.

   Wheat: No leaf stage restriction.
7. **How to Apply**:

   With: Aircraft or ground equipment. Do not use controlled droplet application equipment.

   Rate: 1.0 - 1.13 L/ac.

   Beans, carrots, fababeans, onions, potatoes, soybeans, sugar beets: 1.4 L/ac.

   Wild oats in 4 - 5 leaf stage: 1.1 L/ac.

   When tank mixing: 1.13 L/ac, except with Decis 1.0 - 1.13 L/ac.

   Water volume: Air: 14 L/ac minimum. Ground: 45 L/ac.

   Pressure: Air: 300 kPa. Ground: 275 kPa.

   Nozzles: Only flat fan recommended.

Hoe-Grass 284 *(diclofop-methyl)*

Group 1

Manufacturer **Aventis Crop Science**

DANGER CORROSIVE

1. **Formulations:** Emulsifiable Liquid; 284 g/L; 20 L, 110 L, 400 L containers.
2. **Registered Mixes:** Lontrel (227 mL/ac only)(canola), Pardner [barley*, flax, wheat (durum, spring)], Decis [barley*, canola, flax, mustard, potatoes, wheat (durum, spring, winter)].

   Note: *Barley (except Betzes or Klages).

   Mixing restrictions: Mixing with any broadleaf herbicide other than those registered on the Hoe-Grass 284 label will result in a reduction of grassy weed control.
3. **Crops:**

			Forages, only in year of establishment
barley (8.2)	fababeans (9.0)	spring rye (8.7)	aflalfa (8.5)
(except Betzes, Klages)	fall rye (9.0)	sugar beets (8.5)	alsike clover**
canola (8.9)	field peas (9.0)	sunflowers (8.6)	bromegrass (7.5)
carrots	flax (8.9)	(except Corona)	creeping red fescue (7.9)
dry common beans (8.8)	lentils (8.4)	tame buckwheat (8.6)	crested wheatgrass (7.3)
(only black, pinto, white)	potatoes (8.7)	tame mustard (8.9)	intermediate wheatgrass
dry bulb onion (8.6)	processing peas (9.0)	triticale (8.5)	red cover (8.0)
dry bulb wheat (8.5)	snap beans	winter wheat (8.9)	Russian wild ryegrass (7.6)
durum wheat (8.9)	soybeans (8.8)		sainfoin**
			sweet clover (8.0)

** Seedling legumes for seed production only.

4. **Weeds Controlled:** Wild oats (7.7), foxtail [green (7.6), yellow], barnyard grass (8.0), Persian darnel (6.8), volunteer corn (8.4).
5. **Weeds Suppressed:** None.
6. **When Used:**

   Weeds: Barnyard grass, foxtail, wild oats: 1 - 4 leaf. Persian darnel: 1 - 3 leaf. Volunteer corn: 15 - 25 cm.

   Crops:

   Barley: 1 - 4 leaf, prior to tillering.

   Forages: Only in year of establishment; cannot use for food or feed.

   Wheat: No leaf stage restriction.
7. **How to Apply:**

   With: Aircraft or ground equipment. Do not use controlled droplet application equipment.

   Rate: 1.0 - 1.13 L/ac.

   Beans, carrots, fababeans, onions, potatoes, soybeans, sugar beets: 1.4 L/ac.

   Wild oats in 4 - 5 leaf stage: 1.1 L/ac.

   When tank mixing: 1.13 L/ac, except with Decis 1.0 - 1.13 L/ac.

   Water volume: Air: 14 L/ac minimum. Ground: 45 L/ac.

   Pressure: Air: 300 kPa. Ground: 275 kPa.

   Nozzles: Only flat fan recommended.

8. **Application Tips:** Do not use on Betzes and Klages barley. When tank mixing with bromoxynil, do not delay Hoe-Grass 284 application if grassy weed is in correct stage. Reduced control can be expected if Hoe-Grass 284 is applied to weeds growing under stress. Control may be further reduced if tank mixed. Apply at least 4 days before any broadleaf herbicide, except bromoxynil products, to eliminate a reduced grass kill from Hoe-Grass 284. Not recommended to apply Hoe-Grass 284 after a broadleaf herbicide, during periods of stress, plants are not actively growing, when daytime temperatures are very hot (28°C or 82°F) and/or conditions are very dry and/or there is low humidity. Application of Hoe-Grass during these periods may result in substantially reduced control. Under these conditions, yellow blotches may appear on crop leaves. These blotches will be rapidly outgrown and will not affect maturity or yield. Good spray coverage and penetration may be difficult if weed populations are extremely high. Apply the spray at a forward angle of 45°, and ensure that weeds are young and actively growing.
9. **How it Works:** Contact as well as systemic action. Uptake primarily through leaves and translocated to growing point. Penetration and uptake via roots may occur if soil is sufficiently moist and the rate of application is relatively high.
10. **Expected Results:** Yellowing of susceptible plants is noticeable within 2 - 4 days of application. New leaf growth exhibits light chlorosis which deepens, and browning develops 10 - 14 days after application. Photosynthesis and growth are inhibited and uptake of water and nutrients ceases. Lack of adequate crown root development is evident on wild oats as well as in some sensitive barley varieties.
11. **Effects of Rainfall:** Rainfall within 1 hour will decrease activity.
12. **Movement in Soil:** Some movement in soil if sufficient moisture is present.
13. **Grazing and Cropping Restrictions:**

    Drift: Danger from drift is low.

    Grazing restrictions: Do not graze treated fields prior to harvest. Do not apply within 60 days of harvest.

    Succeeding crops: No restriction.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (2,350). Toxic to fish. Non-toxic to birds. A small amount of vomited liquid inhaled can be fatal.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Do not store below freezing. If stored 1 year or longer, shake well before using.
17. **Resistance Management:** Populations of green foxtail and wild oats tolerant to diclofop-methyl have developed in a number of fields in Western Canada that have had a long history of repeated diclofop-methyl use. To delay selection or reduce the spread of diclofop-methyl tolerant green foxtail and wild oats, avoid use of Hoegrass 284 and Hoegrass II repeatedly in the same field.

Horizon *(clodinafop-propargyl)*

Group 1

Manufacturer: **Novartis Crop Protection Canada Inc.**

CAUTION POISON

1. **Formulation:** Emulsifiable Concentrate; 240 g/L; 1 x 4.7 L Horizon + 2 x 8 L Score.
2. **Registered Mixes:** Target (400 - 600 mL/ac); Dyvel (500 mL/ac); Buctril M (400 mL/ac); Refine Extra (8 g/ac); 2,4-D Amine 500 g/L (340 - 440 mL/ac); MCPA Amine 500 g/L; MCPA Ester 500 (340 - 440 mL/ac); Pardner (400 mL/ac); Ally (3 g/ac); Estaprop (700 mL/ac); Score; Unity (202 mL/ac + 4.3 g/ac); Buctril M Gel 600 g/L (0.37 L/ac); Lontrel 360 g/L + MCPA Ester 500 g/L (0.11 - 0.17 L/ac + 0.45 L/ac), Curtail M (800 mL/ac), Thumper (400 mL/ac), Turboprop (700 mL/ac), Dichlorprop D (700 mL/ac), Attain (240 mL/ac Attain A + 400 mL/ac Attain B).
3. **Crops:** All types of spring and durum wheat.
4. **Weeds Controlled:** Wild oats, foxtail (green, yellow), Persian darnel, barnyard grass, volunteer oats, volunteer canary seed.
5. **Weeds Suppressed:** None.
6. **When Used:**

   Crop: For optimum crop tolerance, apply prior to emergence of the 4th tiller. When tank mixing, always refer to the label of the broadleaf partner herbicide.

   Weeds:

   Wild oats and canary seed: 1 - 6 true leaves on the main stem and prior to emergence of the 4th tiller.

   Green and yellow foxtail, Persian darnel, barnyard grass: 1 - 5 true leaves on the main stem. (For optimum control, apply before tillering and when Persian darnel and barnyard grass are actively growing. For optimum control of green and yellow foxtail, apply prior to emergence of 3rd tiller and while foxtail is actively growing.)

   Volunteer oats: 3 - 6 true leaves on the main stem and prior to emergence of the 4th tiller.
7. **How to Apply:**

   With: Ground equipment. Do not apply by aircraft.

   Rates:
   Wild oats, green and yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed: 95 mL/ac + Score (0.8 % v/v).
   Above weeds + Persian darnel: 115 mL/ac + Score (1.0% v/v).

   Water volume: 40 L/ac.

   Pressure: 275 - 310 kPa.

   Nozzles: 80° or 110° flat fan stainless steel nozzles are recommended for optimal spray coverage.

   Mixing instructions:
   1. Clean spray tank and 1/2 fill with clean water. Start agitation or bypass system.
   2. If a broadleaf herbicide is to be tank mixed, add the product **first** prior to adding Horizon and agitate for 2 - 3 minutes.
   3. Add correct amount of Horizon.
   4. Agitate for 2 - 3 minutes.
   5. Add correct amount of Score Adjuvant.
   6. Agitate for 1 - 2 minutes before adding remainder of water.
   7. After any break in spraying operations, agitate thoroughly before spraying again.
   8. Use the spray suspension as soon as it is prepared.
   9. If an oil film starts to build up in the tank, drain tank and then clean with a detergent.

Sprayer clean-up: Thoroughly clean application equipment immediately after spraying. Ensure all traces of the product are removed. The following recommendations are provided:

1. Drain and flush tank walls, boom and all hoses for ten minutes with clean water. Do not clean the sprayer near desirable vegetation, wells or other water sources.
2. Remove the nozzles and screens and wash separately.
3. Dispose of all rinsings in accordance with provincial regulations.
4. If a broadleaf tank mix partner is used, always check tank mix partner label for any additional clean up procedures.

8. **Application Tips:** For optimum results, apply Horizon to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Application of the spray mixture at a 45° angle in the direction of travel will result in improved spray coverage. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Weeds emerging after application will not be controlled. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.
9. **How it Works:** Horizon is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.
10. **Expected Results:** Grassy Weeds – Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigor will be observed, followed by a browning and complete control 3 - 5 weeks after application.
11. **Effects of Rainfall:** Rainfall within 30 minutes of application may reduce the effectiveness of Horizon.
12. **Movement in Soil:** None.
13. **Grazing and Cropping Restrictions:** Do not treat wheat underseeded to forages. Observe a minimum of 3 days before grazing livestock on crops treated with Horizon.

    Pre-harvest interval: 60 days.
14. **Toxicity:** Acute Oral LD_{50} (rat) (2276 mg/kg); Acute dermal (rat) (4,000 mg/kg).
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store the product in closed, original container in a well-ventilated room.

Hyvar X/X-L *(bromacil)*

Group 5

Manufacturer **DuPont Canada Inc.**

1. **Formulations:** Wettable Powder; Hyvar X; 80%; 2 kg, 25 kg bags. Water Soluble Liquid; Hyvar X-L; 240 g/L; 4 L, 10 L jugs.
2. **Registered Mixes:** None.

   Mixing instructions: Hyvar X: Weigh out proper amount of Hyvar X and mix into necessary volume of water (minimum 20 L/kg of Hyvar X). Agitate continuously by mechanical or hydraulic means.
3. **Crops:** Non-crop areas only. Total vegetation control.
4. **Weeds Controlled:** A non-selective, total vegetation control chemical for weeds, grasses and some brush.
5. **Weeds Suppressed:** Not applicable.

Hyvar X/X-L (cont'd)

6. **When Used:** Just before or during the period of active weed growth. Do not apply when ground is frozen.

   Brush: Apply in spring or summer as a basal (spot) treatment.

7. **How to Apply:**

   Hyvar X-L:

   With: Power sprayer. Handguns, backpack sprayers or a watering can may be used to treat small areas.

   Rate:

   Initial treatment: Apply 12 - 18 L/ac. Higher dosage on soils containing 5% or more organic matter, or soils high in clay content.

   Retreatment of regrowth: 7 - 9 L/ac.

   Small areas: 450 mL/100 m^2.

   Brush control: Spot Treatment Undiluted: At 8 mL/m of tree height up to 3 m. Four or five 8 mL deposits around the root collar for brush taller than 3 m with a spot gun. Spot Treatment Diluted: mix 1 L in 5 L of water, apply in 55 mL deposits with a spot gun.

   Hyvar X:

   With: Same as Hyvar X-L, except more efficient agitation of the spray solution is required.

   Rate:

   Initial treatment: 3 - 5 kg/ac. Use the higher dosage on soils containing 5% or more organic matter, or soils high in clay content.

   Retreatment of regrowth: 1.5 - 2.7 kg/ac.

   Small areas: 135 g/100 m^2.

   Brush control: Mix 870 g Hyvar X in 10 L of water and apply 30 - 60 mL/stem 5 - 10 cm in basal diameter. Wet base of stem to point of runoff.

   Water volume: 100 - 1000 L/ac. Use enough water to uniformly cover the area to be treated. Hyvar X-L: With a handgun, apply 650 L of spray solution/ac. Hyvar X: Minimum of 20 L of water/kg of Hyvar X.

   Nozzles: Screens should be 50 mesh or larger.

8. **Application Tips:**

   Weed control: If dense growth is present, results will be improved if vegetation is removed before treatment. Do not apply closer then 1.5 times the height of nearby trees. Roots from large trees may extend well beyond the height of the tree and may extend beneath areas to be treated. Be cautious where trees are in close proximity to the treatment site. Do not apply to brush standing in water, lawns, walks, driveways, tennis courts or similar areas. Applying, draining or flushing equipment too near feeding roots of susceptible vegetation may cause injury. Thoroughly clean all traces of Hyvar from application equipment immediately after use.

9. **How it Works:** Hyvar X is readily absorbed through the roots but much less readily through the leaves. Once in the plant, it inhibits photosynthesis.

10. **Expected Results:** Susceptible plants become chlorotic and then die. Vegetation kill is faster with higher rainfall. Degree and duration of control depends on amount of chemical applied, soil type, rainfall and other conditions. Brush: final kill may not take place until the year following treatment. **Poor results may be expected if** weed growth too mature or if there is insufficient rainfall.

11. **Effects of Rainfall:** Rainfall will carry the chemical into the root zone where it is absorbed.

12. **Movement in Soil:** Movement in soil is dependent upon soil type and soil moisture. Bromacil will move faster in a vertical direction in sandy soils than in soils high in organic matter or clay content. Movement can be severe on slopes.

13. **Grazing and Cropping Restrictions:**

    Drift: All crops and ornamentals may be injured by chemical drift. Do not apply in areas subject to severe soil erosion.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (5,200). Toxic to fish. Intake of Hyvar X-L can cause damage to lungs, liver, heart and kidney and can lead to a coma. May also cause blindness.
15. **Precautions, First Aid:** Hyvar X-L is combustible. While applying undiluted product, do not smoke and keep away from heat and open flame. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Hyvar X: Store in a cool, dry place. Hyvar X-L: Combustible, keep away from heat or open flame. Do not allow to freeze.

IPCO Granular Soil Sterilant *(sodium metaborate tetrahydrate + sodium chlorate + diuron)*

CAUTION POISON

Manufacturer: **IPCO**

1. **Formulations:** Dry granule; 66.5% sodium metaborate tetrahydrate + 30% sodium chlorate + 1.25% diuron; 1 kg, 4 kg, 22.7 kg bags.
2. **Registered Mixes:** None.
3. **Crops:** Non-crop areas, where long term, total vegetation control is desired.
4. **Weeds Controlled:** All growth. Annual broadleaf weeds and grasses. Perennial weeds.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** In early spring when weeds are small, up to 15 cm tall, or in fall when weeds are dormant.
7. **How to Apply:**

   With: Shaker can, mechanical spreader or knapsack sprayer.

   Rate:

   Annual weeds: 0.5 - 1 kg/10 m^2 – for dry application, apply when rain is expected or when watering.

   Persistent perennial weeds: 1 - 2 kg/10 m^2 – either at maturity of weed or on damp soil in spring. Use higher rates on deep rooted perennials.
8. **Application Tips:**

   Limitations:

   – Do not apply in hot, dry weather.
   – To avoid fire hazard from dead and dry vegetation, treat when weeds are small. If growth is well advanced, mow and rake before treatment.
   – Do not apply on or near desirable plants or on areas into which their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.
   – Dried chemical residue on organic matter can be explosive.
   – Spray solution will damage leather.
9. **How it Works:** Kills through contact action if applied as a foliar spray or root uptake. Persists in the soil and provides prolonged control of germinating seedlings and regrowth from perennial roots. Length of control depends on species, rate, soil type, rainfall, vegetation cover and time of application.
10. **Expected Results:** Seedlings are controlled quickly. Slower kill on perennial weeds.

IPCO Granular Soil Sterilant (cont'd)

11. **Effects of Rainfall:** Rainfall will move the chemical into the soil and enhance its activity. In areas of high rainfall or sandy soils, the residual effect is reduced due to leaching.
12. **Movement in Soil:** Limited.
13. **Grazing and Cropping Restrictions:** Treated area will be rendered more or less unproductive for 1 or more years.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (2,000). May cause irritation of eyes, nose, throat and skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in cool, dry place. Avoid direct contact with ground or concrete floors when storing.

Karmex DF *(diuron)*

Group 7

Manufacturer: **DuPont Canada Inc.**

1. **Formulations:** Dry flowable; 80%; 2 kg, 25 kg packs.
2. **Registered Mixes:** None.

   Mixing instructions: Agitate continuously by mechanical or hydraulic means.
3. **Crops:** Asparagus, irrigation and drainage ditches, ponds, dug-outs and spot treatment for general weed control. Non-crop areas.
4. **Weeds Controlled:** Broadleaf and grassy weed seedlings.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** May be used at any time, except when the ground is frozen. Best results obtained when applied shortly before weed growth begins. Dense weed growth should be removed first, then treatment applied. Sufficient rainfall or irrigation is necessary following treatment to carry the chemical to the root zone.

   Asparagus (established): No earlier than 4 weeks before spear emergence and no later than the early cutting period.

   Irrigation and drainage ditches: Before expected seasonal rainfall, if possible when soil in the ditch is still moist. Apply during the non-crop season when the ditch is not in use.
7. **How to Apply:**

   With: Field sprayer, hand sprayer, back-pack or sprinkling can.

   Rate:

   General weed control: Sandy or sandy loam soils 5.8 - 11 kg/ac. Clays or high organic soils 16 - 22 kg/ac. Use the lower rate when annual weed growth predominates and where only one season's control is desired.

   Retreatment of regrowth: Annuals and seedlings 500 g/ac.

   Irrigation and drainage ditches: 250 - 750 g/100 m^2 or 9.3 - 27 kg/ac. Flush once before using for irrigation purposes. Karmex must be fixed in the soil by moisture to minimize movement in irrigation water.

   Spot treatment: Quackgrass, toadflax 0.75 - 1.0 kg/100 m^2.

   Small areas: 50 g/10 m^2 is equal to 20.2 kg/ac.

   Water volume: Use 100 - 160 L of water/acre to provide thorough, uniform coverage.

   Nozzles: Screens should be 50 mesh or larger.

8. **Application Tips:** Do not use on sand, loamy sand or gravelly soils with less than 1% organic matter. Spray booms must be shut off while starting, turning, slowing or stopping as injury to the crop may result. Do not apply to newly seeded asparagus or to young plants during the first growing season after setting or on plants with exposed roots as severe injury may result. **Do not apply to slopes as soil erosion may occur.** Applying, draining or flushing equipment too near feeding roots of susceptible vegetation may cause injury. Do not use on lawns, walks, driveways, tennis courts or similar areas. Thoroughly clean all traces of Karmex from application equipment after use.
9. **How it Works:** Diuron is readily absorbed through the root system and less readily absorbed through stem and foliage.
10. **Expected Results:** Susceptible plants become chlorotic soon after treatment and then die. Degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other conditions. Regrowth of plantain, thistle, or wild carrot will indicate that retreatment is necessary. **Poor control may be expected if** inadequate rate or weeds too old or insufficient rainfall.
11. **Effects of Rainfall:** Rainfall will activate the chemical, carrying it into the root zone.
12. **Movement in Soil:** Diuron absorbs readily to the soil, and there is little movement by leaching.
13. **Grazing and Cropping Restrictions:**

    Drift: All crops and ornamentals may be injured by chemical drift.

    Succeeding crops: Do not replant treated areas to any crop within 2 years after last treatment as injury to subsequent crops may result.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (3,400). Non-toxic to birds and fish.

15 **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place.

Kerb 50W *(propyzamide)*

Group 15

Manufacturer: **Rohm and Haas Canada Inc.**

1. **Formulations:** Wettable Powder; 50%; 2.0 kg bags. **Order directly from United Agri Products or Van Waters and Rogers.**
2. **Registered Mixes:** None specified.
3. **Crops:** Alfalfa (established) (8.7), bird's-foot trefoil (established), grass (established), pastures (grass/legume).
4. **Weeds Controlled:**

   chickweed (8.2)
   dodder
   foxtail barley (7.5)
   grasses (most annual) (8.3)
   orchard grass (8.3)
   seedling quackgrass (7.4)
   timothy
   volunteer barley
   volunteer wheat
   wild oats (5.9)
5. **Weeds Suppressed:** None.

M121

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Kerb 50W (cont'd)

6. **When Used:**

   Fall: Alfalfa, bird's-foot trefoil. Apply between October 1 and freeze-up. Best results are obtained when soil temperature is low but above freezing, and soil moisture is high.

   Spring: Alfalfa (grown for seed). For optimum control, the soil temperature should be cool.

7. **How to Apply:**

   With: Ground equipment only.

   Rate:

Fall	g/ac
Alfalfa, bird's-foot trefoil (established)	
– annual grasses, volunteer grain, wild oats	710
– quackgrass, orchard grass, timothy, chickweed	910 - 1310
Pasture (established) – Brown, Dark Brown, Grey Wooded soils	275 - 365
– Thin Black or Black soils	365 - 455

Spring	g/ac
Alfalfa (grown for seed)	
– annual grasses, volunteer grain, wild oats	710 (maximum)
– quackgrass, orchard grass, timothy, chickweed	910 (maximum)

   Water volume: 40 - 200 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan. 50 mesh or larger metal filters and nozzle screens.

   Incorporation: None. Spring application on alfalfa, if soil temperature is high and moisture content low, a light incorporation is recommended.

8. **Application Tips:** Do not use on highly organic peat or muck soils. Avoid application to timothy, fescue, crested wheat grass or perennial bluegrass. In fall, rain in 1 or 2 days or a light overhead irrigation (1.25 - 2.5 cm) improves results.
9. **How it Works:** Root absorption. Inhibits cell division.
10. **Expected Results:** Plant growth stops; plant turns brown and dies.
11. **Effects of Rainfall:** Improves efficacy.
12. **Movement in Soil:** Very little leaching. Readily absorbed on organic matter.
13. **Grazing and Cropping Restrictions:** Do not harvest or graze within 90 days of applying 1.3 kg/ac or 60 days after lower rates. Wait 9 months before planting other crops.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (5,620 - 8,350).
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in cool, dry place.

Kerb 50W (cont'd)

6. **When Used**:

   Fall: Alfalfa, bird's-foot trefoil. Apply between October 1 and freeze-up. Best results are obtained when soil temperature is low but above freezing, and soil moisture is high.

   Spring: Alfalfa (grown for seed). For optimum control, the soil temperature should be cool.

7. **How to Apply**:

   With: Ground equipment only.

   Rate:

Fall	**g/ac**
Alfalfa, bird's-foot trefoil (established)	
– annual grasses, volunteer grain, wild oats	710
– quackgrass, orchard grass, timothy, chickweed	910 - 1310
Pasture (established) – Brown, Dark Brown, Grey Wooded soils	275 - 365
– Thin Black or Black soils	365 - 455
Spring	**g/ac**
Alfalfa (grown for seed)	
– annual grasses, volunteer grain, wild oats	710 (maximum)
– quackgrass, orchard grass, timothy, chickweed	910 (maximum)

   Water volume: 40 - 200 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan. 50 mesh or larger metal filters and nozzle screens.

   Incorporation: None. Spring application on alfalfa, if soil temperature is high and moisture content low, a light incorporation is recommended.

8. **Application Tips:** Do not use on highly organic peat or muck soils. Avoid application to timothy, fescue, crested wheat grass or perennial bluegrass. In fall, rain in 1 or 2 days or a light overhead irrigation (1.25 - 2.5 cm) improves results.
9. **How it Works:** Root absorption. Inhibits cell division.
10. **Expected Results:** Plant growth stops; plant turns brown and dies.
11. **Effects of Rainfall:** Improves efficacy.
12. **Movement in Soil:** Very little leaching. Readily absorbed on organic matter.
13. **Grazing and Cropping Restrictions:** Do not harvest or graze within 90 days of applying 1.3 kg/ac or 60 days after lower rates. Wait 9 months before planting other crops.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (5,620 - 8,350).
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in cool, dry place.

Krenite *(fosamine)*

Manufacturer **DuPont Canada Inc**

1. **Formulations:** Water Soluble Liquid; 480 g/L; 10 L pack.
2. **Registered Mixes:** None.

   Non-ionic surfactants: Tween 20.
3. **Crops:** Brush control on non-crop areas only.
4. **Weeds Controlled:**

   alder
   ash
   balsam fir*
   beech
   birch
   cherry*
   elm
   hazel
   hemlock*
   largetooth aspen*
   maple
   oak
   pine
   trembling aspen poplar
   white spruce*

   * Highest rate.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** From mid-June to end of July.
7. **How to Apply:**

   With: High volume ground equipment.

   Rate: 10.0 - 15.0 L/1,000 L of water. Add 1 - 2 L of surfactant to the mixture. Use higher rate for balsam fir, cherry, hemlock, largetooth aspen, white spruce.

   Water volume: 200 - 1,200 L of spray solution/ac to point of runoff.

   Nozzles: Flat fan recommended.
8. **Application Tips:** Do not apply to food crops. A non-ionic surfactant is required to control most conifers and to control the root suckering of deciduous brush.
9. **How it Works:** Absorbed by leaves, stems and buds. Restricts bud development the following spring.
10. **Expected Results:** Injury may not be observed until the following spring, particularly if minimum rates are used or if cool temperatures prevail when spraying is done. Plants will fail to develop leaves and subsequently die.
11. **Effects of Rainfall:** Rainfall within 24 hours of application may reduce effectiveness.
12. **Movement in Soil:** Little downward movement as Krenite readily adsorbs to soil colloids.
13. **Grazing and Cropping Restrictions:** Do not graze on land treated with Krenite.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (24,000). Non-toxic to birds and fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place.

Krovar I *(bromacil + diuron)*

Group 5,7

Manufacturer: **DuPont Canada Inc.**

1. **Formulations:** Dry flowable; 40% bromacil + 40% diuron; 2 kg, 25 kg bags.
2. **Registered Mixes:** Telar at 48 g/ac + surfactant.

   Mixing instructions: Weigh out the proper amount of Krovar and mix into necessary volume of water (minimum 20 L water/kg of Krovar). Agitate continuously by mechanical or hydraulic means. Do not use air agitation. If mixing with Telar, add the Telar first, then the required amount of Krovar, then surfactant.
3. **Crops:** Non-crop areas only. Total vegetation control.
4. **Weeds Controlled:** Most annual and perennial weeds and grasses.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** Before weeds emerge or when actively growing. Remove dense growth before treatment. Do not apply when ground is frozen. Sufficient moisture is required to carry the chemical to the root zone of the weeds.
7. **How to Apply:**

   With: Boom sprayer, handgun, back pack or sprinkling can.

   Rate:

   General weed control: 5.3 - 7.3 kg/ac. Use higher rates on soils containing 5% or more organic matter or soils high in clay content. Use 5.5 kg/ac on sandy or sandy loam soils only.

   Retreatment of regrowth: 2.75 - 3.6 kg/ac when annual weeds reappear on previously treated sites.

   Small areas: 180 g/100 m^2, approximately 7.3 kg/ac.

   Water volume: 20 L water (minimum)/kg of Krovar I. 100 - 1000 L/ac. Use enough water to uniformly cover area to be treated.

   Nozzles: Screens should be 50 mesh or larger.
8. **Application Tips:** Applying, draining or flushing equipment too near feeding roots of susceptible vegetation may cause injury. Do not use on lawns, walks, driveways, tennis courts or similar areas. **Do not apply to slopes as soil erosion may occur.** Thoroughly clean all traces of Krovar I from application equipment immediately after use.
9. **How it Works:** Readily absorbed through the roots, leaves and stems.
10. **Expected Results:** Plants become chlorotic and then die. The degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other factors. **Poor results occur if** weeds are too mature or if insufficient rainfall.
11. **Effects of Rainfall:** Rainfall will leach the chemical into the root zone.
12. **Movement in Soil:** Movement in soil is faster with heavier rainfall. Do not use in areas subject to soil erosion.
13. **Grazing and Cropping Restrictions:**

    Drift: All crops and ornamentals may be injured by chemical drift.

    Succeeding crops: Krovar I is a non-selective residual herbicide. It should only be used on non-crop areas where bare ground is desired.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = bromacil (5,200), diuron (3,400). Non-toxic to birds. Toxic to fish.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place.

Laddok *(bentazon + atrazine)*

[illegible] **Group 5,6**

Manufacturer: **BASF**

CAUTION POISON

1. **Formulations:** Liquid Suspension: 200 g/L bentazon + 200 g/L atrazine; 1 x 10 L Laddok + 1 x 8 L Assist Oil Concentrate.
2. **Registered Mixes:** None.

   Surfactant: Assist Oil Concentrate.
3. **Crops:** Corn (field, seed, silage, sweet). Seed corn producers should consult the seed corn company regarding tolerance of seed production lines to Laddok + Assist Oil Concentrate.
4. **Weeds Controlled:**

   annual smartweeds
   bird rape*
   black nightshade
   buttercup
   cocklebur
   common chickweed
   common gsel*
   common ragweed
   corn spurry
   giant ragweed*
   hairy galinsoga
   lady's-thumb
   lamb's-quarters*
   low cudweed
   purslane
   redroot pigweed*
   Russian thistle
   velvetleaf
   wild mustard

   * Triazine resistant strains of these weeds are controlled by Laddok.
5. **Weeds Suppressed:** None.
6. **When Used:** Apply early post-emergence when weeds are small and actively growing (usually corresponds to corn growth stages of 1 - 5 leaves). Under good growing conditions, the most effective time for application usually is 18 - 28 days after planting. A cultivation may be necessary if additional weeds emerge after the application. Corn is tolerant to Laddok at all stages of growth.
7. **How to Apply:**

   With: Ground equipment.

   Rate: 1.2 - 1.6 L/ac. Use the rate appropriate for weed size as shown in the application rate table of the Laddok label. Where **Dual** has been applied as a pre-emergent grass herbicide, the application rate of Laddok may be reduced to 0.8 - 1.0 L/ac. Assist Oil Concentrate at 1.0 L/100 L of spray volume should be added for all applications of Laddok.

   Water volume: 80 - 160 L/ac.

   Pressure: 275 - 400 kPa.

   Nozzles: Flat fan or cone type only recommended.
8. **Application Tips:** Best results if weeds are young and actively growing. Do not apply where runoff erosion is likely to occur. Do not apply if crop is under stress from prolonged cold weather, poor fertility or when crop is wet and succulent from recent rainfall as crop injury may occur. It is important to obtain complete spray coverage of all leaves for best control.
9. **How it Works:** Both bentazon and atrazine are contact herbicides interfering with photosynthesis.

Laddok (cont'd)

10. **Expected Results:**

    Weeds: Turn yellow, then brown, usually within 2 weeks.

    Crops: Occasionally show light leaf speckling. **Poor results may occur if** weeds are too mature, if spray fails to penetrate crop canopy or under conditions of prolonged cool weather or drought.

11. **Effects of Rainfall:** Within 6 - 8 hours may reduce activity.
12. **Movement in Soil:** Very little, except in sandy soil and with excessive moisture.
13. **Grazing and Cropping Restrictions:**

    Grazing restrictions: Treated plants can be used for silage.

    Succeeding crops: On very light soils with low organic matter, some atrazine may carry over and injure susceptible crops. Injury may also occur if land treated with Laddok is planted to any crop other than corn in the same season.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (3,000). Intake may cause convulsions and coma.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place above 0°C.

Laser DF *(fenoxaprop-p-ethyl + MCPA + thifensulfuron)*

[illegible] **Group 1,2,4**

Manufacturer **Aventis Crop Science**

CAUTION POISON

1. **Formulations:**

    Greenfox: Emulsifiable Concentrate; 28 g/L fenoxaprop-p-ethyl + 336 g/L MCPA Ester; 10.1 L container.

    DF: Dryflowable; 75% thifensulfuron; 162 g container.

2. **Registered Mixes:** No surfactant required. Lontrel: 85 mL/ac for season-long control of Canada thistle in spring wheat only.
3. **Crops:** All spring wheats. Durum wheat only if 2,4-D Ester is added to tank mix (see below for 2,4-D rate).
4. **Weeds Controlled:**

    annual sunflower
    burdock
    chickweed
    cocklebur
    corn spurry
    cow cockle
    field horsetail**
    flixweed*
    green foxtail
    green smartweed
    hemp-nettle
    hoary cress**
    lady's-thumb
    kochia
    lamb's-quarters
    mustards (except dog and green tansy)
    plantain**
    prickly lettuce
    ragweeds
    redroot pigweed
    Russian pigweed
    Russian thistle*
    shepherd's-purse
    stinkweed
    vetch
    volunteer rapeseed
    wild buckwheat
    wild radish

    * Spring seedings only.
    ** Top growth control only.

5. **Weeds Suppressed:** Canada thistle.

6. When Used:

Crop: Apply when the crop has a minimum of 2 leaves and up to maximum of 6 leaves on the main stem plus 3 tillers.

Annual grassy weeds: Apply when green foxtail is in the 1 - 6 leaf stage of growth. Total number of leaves on main shoot and tillers not to exceed 6.

Broadleaf weeds: Annual sunflower, ball mustard, burdock, cocklebur, field horsetail, flixweed, hoary cress, kochia, mustards, plantain, prickly lettuce, ragweeds, Russian pigweed, shepherd's-purse, vetch and wild radish: apply at 2 - 4 leaf stage. Corn spurry, cow cockle, green smartweed, hemp-nettle, lady's-thumb, lamb's-quarters, redroot pigweed, Russian thistle, stinkweed, volunteer rapeseed and wild mustard: apply when weeds are less than 10 cm tall or across. Chickweed: apply at 1 - 6 leaf stage; wild buckwheat: apply at 1 - 3 leaf stage. Apply to emerged, young actively growing weeds. Weeds that emerge after application will not be controlled.

Note: Treatment at the 3 - 4 leaf stage of crops and weeds usually combines maximum crop tolerance and weed susceptibility. Some broadleaf weeds may not be controlled if infestation is heavy, weeds are in bud or weather is dry and cool.

7. How to Apply:

With: Ground equipment. Do not apply by aircraft.

Rate:
Greenfox: 0.51 L/ac. **DF**: 8.1 g/ac. **Durum wheat**: Add 70 mL/ac 2,4-D LV600 or 60 mL/ac 2,4-D LV700.

Water volume: 45 L/ac.

Pressure: Ground: 275 kPa.

Nozzles: Only 110° or 80° stainless steel flat fan nozzles are recommended. Uniform, thorough coverage is important to achieve good control.

Mixing instructions:

1. Ensure the spray tank is thoroughly clean.
2. Fill the tank half full with clean water and start agitation or bypass system.
3. Slowly add the correct amount of DF (container #1) to the spray tank. Agitate thoroughly until DF is completely in suspension.
4. Add the correct amount of Greenfox (container #2) and continue agitation.
5. Triple rinse the containers into the spray tank.
6. Add the remaining amount of water while agitation continues. Spray out immediately. Spray mixture should not be left in tank overnight.
7. On repeat loads, prepare a DF slurry in water by slowly adding the correct amount of thifensulfuron to 20 litres of water, and add to spray tank. Agitate thoroughly until completely in suspension. Repeat steps 4, 5 and 6.

Sprayer cleanup:

When moving into wheat, barley, rye or flax:
When moving into wheat, barley, spring or fall rye, or flax immediately following the application of Laser DF Tank Mix, clean the sprayer by thoroughly flushing with a water/detergent mixture.

Note: Broadleaf crops can be damaged by Laser DF Tank Mix residues in the spray tank even after a number of applications of a different product. It is critical to thoroughly clean and remove all traces of Laser DF Tank Mix from the spray tank prior to moving into a broadleaf crop.

When moving into broadleaf crops:
In all cases prior to spraying a broadleaf crop (such as canola, peas, lentils, alfalfa, sugar beets, vegetables, etc.), complete a thorough cleaning of the tank, because DF component of the Laser DF Tank Mix can cause crop injury to sensitive crops at very low concentrations. Follow the cleanup instructions below to ensure adequate sprayer cleaning and removal of the Laser DF Tank Mix.

Laser DF (cont'd)

Cleanup instructions prior to spraying broadleaf crops:

1. Drain tank; then flush tank, boom and hoses with clean water for a minimum of ten minutes to remove all visible residues.
2. Fill the tank with clean water while adding 1 litre of household ammonia (containing a minimum of 3% ammonia) per 100 L of water. Fill boom and hoses with solution and allow sprayer to sit for 15 minutes and then drain.
3. Repeat step 2.
4. Nozzles and screens should be removed and cleaned separately.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes flushing water through the hoses and boom.

8. **Application Tips:** Do not treat spring wheat underseeded to forages. During periods of stress, plants are not actively growing. When daytime temperatures before or after application are very hot (28°C or 82°F) and/or conditions are very dry and/or there is low humidity, plants are under stress. Application of Laser DF tank mix during these periods may result in substantially reduced control. Application of the spray at a forward angle of 45° will result in better penetration of the canopy and better coverage. Do not apply to crop stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result.

   Caution: If Laser DF is to be applied to **durum wheat**, ensure the correct amount of 2,4-D is added to every spray tank, otherwise severe damage to durum wheat will occur.

9. **How it Works:**

   Fenoxaprop-p-ethyl: Contact as well as systemic, no soil activity. Regions of high meristematic activity, such as root and shoot tips, are known to be affected. MCPA: disrupts cell division and causes abnormal growth responses that affect respiration and food reserves. Thifensulfuron: absorbed by foliage. Inhibits cell elongation.

10. **Expected Results:** Grassy weeds – reduction of leaf growth and chlorotic blotching within 1 - 3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and complete death within 14 - 21 days after application. Broadleaf weeds – growth stops almost immediately. Discoloration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed susceptibility. **Poor results may be expected if** improper mixing, timing, coverage or when weeds are under drought stress.
11. **Effects of Rainfall:** Do not apply Laser DF if rain is expected within 2 hours.
12. **Movement in Soil:** Fenoxaprop-p-ethyl appears to undergo rapid hydrolysis in the soil. MCPA is readily leached from the soil. Thifensulfuron moves little in the soil and has a very short life in the soil.
13. **Grazing and Cropping Restrictions:** Do not graze treated fields prior to harvest. Pre-harvest interval: 70 days.
14. **Toxicity:** Greenfox – acute oral LD_{50} (rats) (mg/kg) = 3,090. DF – acute oral LD_{50} (rats) (mg/kg) > 5,000.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Keep away from fire or open flame or other sources of heat. **Cannot** be stored below freezing. If stored for 1 year or longer, shake well before using. Store the tightly closed containers away from seeds, fertilizer, plants and foodstuffs. Do not use or store in or around the home.
17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Refine Extra, the DF component of Laser DF and the Plus component of Champion Plus and Triumph Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

M121

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Liberty *(glufosinate ammonium)*

Group 10

Manufacturer **Aventis Crop Science**

DANGER POISON

1. **Formulations:** Liquid; 150g/L; 13.5 L jug.
2. **Registered Mixes:** Venture 25DG, Select.
3. **Crops:** Canola varieties tolerant to Liberty. These varieties will be labelled with Liberty Link symbol.
4. **Weeds Controlled:**

barnyard grass
common chickweed
cow cockle
dandelion
flixweed
green foxtail
hemp-nettle
lamb's-quarters
perennial sow-thistle
redroot pigweed
round-leaved mallow
scentless chamomile
smartweed (lady's-thumb)
stinkweed
stork's-bill
volunteer canola
volunteer wheat
wild buckwheat
wild mustard
wild oats

5. **Weeds Suppressed:** Canada thistle, quackgrass and volunteer barley.
6. **When Used:** Apply Liberty from the cotyledon stage up to the early bolting stage of canola. Slight discolouration of the canola may be visible after application. This effect is temporary and will not influence crop growth, maturity or yield.
7. **How to Apply:**

With: Ground equipment only. Do not apply by air.

Rate: Best control will be obtained when Liberty is applied in the recommended leaf stages.

[illegible]	
barnyard grass	1 - 4 leaves
cow cockle	1 - 4 leaves
green foxtail*	1 - 6 leaves (maximum 3 tillers)
lamb's-quarters	1 - 6 leaves
Russian thistle	up to 8 cm
smartweed (lady's-thumb)	1 - 6 leaves
stinkweed	1 - 8 leaves
volunteer canola	1 - 4 leaves
volunteer flax	up to 6 cm
wild mustard	1 - 5 leaves

* Fields with only green foxtail; 538 mL/ac.

Liberty *(glufosinate ammonium)*

Group 10

Manufacturer: **Aventis Crop Science**

DANGER POISON

1. **Formulations:** Liquid; 150g/L; 13.5 L jug.
2. **Registered Mixes:** Venture 25DG, Select.
3. **Crops:** Canola varieties tolerant to Liberty. These varieties will be labelled with Liberty Link symbol.
4. **Weeds Controlled:**
   - barnyard grass
   - common chickweed
   - cow cockle
   - dandelion
   - flixweed
   - green foxtail
   - hemp-nettle
   - lamb's-quarters
   - perennial sow-thistle
   - redroot pigweed
   - round-leaved mallow
   - scentless chamomile
   - smartweed (lady's-thumb)
   - stinkweed
   - stork's-bill
   - volunteer canola
   - volunteer wheat
   - wild buckwheat
   - wild mustard
   - wild oats
5. **Weeds Suppressed:** Canada thistle, quackgrass and volunteer barley.
6. **When Used:** Apply Liberty from the cotyledon stage up to the early bolting stage of canola. Slight discolouration of the canola may be visible after application. This effect is temporary and will not influence crop growth, maturity or yield.
7. **How to Apply:**

   With: Ground equipment only. Do not apply by air.

   Rate: Best control will be obtained when Liberty is applied in the recommended leaf stages.

Apply Liberty at 810 mL/ac

Weed	Leaf Stage
barnyard grass	1 - 4 leaves
cow cockle	1 - 4 leaves
green foxtail*	1 - 6 leaves (maximum 3 tillers)
lamb's-quarters	1 - 6 leaves
Russian thistle	up to 8 cm
smartweed (lady's-thumb)	1 - 6 leaves
stinkweed	1 - 8 leaves
volunteer canola	1 - 4 leaves
volunteer flax	up to 6 cm
wild mustard	1 - 5 leaves

* Fields with only green foxtail; 538 mL/ac.

Liberty (cont'd)

Apply Liberty at 1.08 L/ac

Weed	Leaf Stage
Canada thistle (top growth suppression only)**	10 cm height
common chickweed	1 - 4 leaf pairs
hemp-nettle	1 - 3 leaf pairs
kochia	up to 8 cm
perennial sow-thistle	1 - 8 leaves
quackgrass (top growth suppression only)	1 - 4 leaves
redroot pigweed	1 - 4 leaves
round-leaved mallow	1 - 4 leaves
scentless chamomile	up to 10 cm
shepherd's-purse	1 - 6 leaves
volunteer barley** (suppression only)	1 - 4 leaves (maximum 2 tillers)
volunteer wheat**	1 - 4 leaves (maximum 2 tillers)
wild buckwheat**	1 - 3 leaves

** Use 1.35 L/ac for heavy populations. For control of volunteer barley, add Venture at 40 - 80 g/ac with recommended adjuvant. For control of volunteer barley and wild oats, add Select at 26 mL/ac plus adjuvant recommended on the Select label.

Apply Liberty at 1.35 L/ac

Weeds	Leaf Stage
cleavers	1 - 2 whorls
dandelion	1 - 15 cm rosette
flixweed	1 - 10 cm
hemp-nettle	1 - 4 leaf pairs
quackgrass (season-long control)	1 - 4 leaves
stork's-bill	1 - 3 leaves
wild oats	1 - 4 leaves (maximum 2 tillers)

For control of volunteer barley and enhanced control of wild oats, add Select at 26 mL/ac plus adjuvant recommended on Select label.

Apply Liberty at 1.62 L/ac

Weed	Leaf Stage
Canada thistle (better top growth suppression)	10 cm height
quackgrass (season-long control for heavy populations)	1 - 4 leaves

Second application: A second application of Liberty can be made to fields treated initially with up to 1.35 L/ac if new weed germination or growth is present. Apply when the new weed growth is in the correct leaf stage and up to the early bolting stage of canola growth. Do not apply more than 1.35 L/ac on the second application.

Water volume: 45 L/ac.

Pressure: 275 kPa (310 kPa if check valves used).

Nozzles: Only 110° or 80° flat fan recommended for optimum spray coverage and canopy penetration. Application of the spray at a 45° angle forward will result in better spray coverage. **Do not use flood jet nozzles, controlled droplet application equipment or air-assisted spray equipment. Uniform, thorough spray coverage is important to achieve consistent weed control.**

Liberty (cont'd)

Apply Liberty at [illegible] L/ac

Weed	Leaf Stage
Canada thistle (top growth suppression only)**	10 cm height
common chickweed	1 - 4 leaf pairs
hemp-nettle	1 - 3 leaf pairs
kochia	up to 8 cm
perennial sow-thistle	1 - 8 leaves
quackgrass (top growth suppression only)	1 - 4 leaves
redroot pigweed	1 - 4 leaves
round-leaved mallow	1 - 4 leaves
scentless chamomile	up to 10 cm
shepherd's-purse	1 - 6 leaves
volunteer barley** (suppression only)	1 - 4 leaves (maximum 2 tillers)
volunteer wheat**	1 - 4 leaves (maximum 2 tillers)
wild buckwheat**	1 - 3 leaves

** Use 1.35 L/ac for heavy populations. For control of volunteer barley, add Venture at 40 - 80 g/ac with recommended adjuvant. For control of volunteer barley and wild oats, add Select at 26 mL/ac plus adjuvant recommended on the Select label.

Apply Liberty at [illegible] L/ac

Weeds	Leaf Stage
cleavers	1 - 2 whorls
dandelion	1 - 15 cm rosette
flixweed	1 - 10 cm
hemp-nettle	1 - 4 leaf pairs
quackgrass (season-long control)	1 - 4 leaves
stork's-bill	1 - 3 leaves
wild oats	1 - 4 leaves (maximum 2 tillers)

For control of volunteer barley and enhanced control of wild oats, add Select at 26 mL/ac plus adjuvant recommended on Select label.

[illegible]

[illegible]	[illegible]
Canada thistle (better top growth suppression)	10 cm height
quackgrass (season-long control for heavy populations)	1 - 4 leaves

Second application: A second application of Liberty can be made to fields treated initially with up to 1.35 L/ac if new weed germination or growth is present. Apply when the new weed growth is in the correct leaf stage and up to the early bolting stage of canola growth. Do not apply more than 1.35 L/ac on the second application.

Water volume: 45 L/ac.

Pressure: 275 kPa (310 kPa if check valves used).

Nozzles: Only 110° or 80° flat fan recommended for optimum spray coverage and canopy penetration. Application of the spray at a 45° angle forward will result in better spray coverage. **Do not use flood jet nozzles, controlled droplet application equipment or air-assisted spray equipment. Uniform, thorough spray coverage is important to achieve consistent weed control.**

Mixing instructions:

1. Fill tank within one-half the amount of clean water.
2. Add the correct amount of Liberty.
3. Add the remaining amount of water, begin agitation and spray out immediately.

Note: Ensure that all circuits (pipes, booms, etc.) have the correct Liberty/water concentration before application is started.

Note: The addition of an anti-foaming agent may reduce foaming, especially when using soft water.

Sprayer cleanup: Before and after using Liberty, always complete a thorough cleaning of the spray tank, lines and filter. Spray equipment should be thoroughly rinsed using a strong detergent solution.

8. **Application Tips:** For best results, apply to emerged, young actively growing weeds. Weeds that emerge after application will not be controlled. Liberty will have an effect on weeds larger than the recommended leaf stage; however, speed of activity and control may be reduced.

9. **How it Works:** Liberty works primarily as a contact herbicide. Thorough coverage of the weeds to be controlled is essential. Absorbed by all leaf and stem surfaces. Interferes with plants' ability to detoxify ammonia. The speed of action of Liberty is influenced by environmental factors. At cool temperatures (below 10°C), poor moisture and low humidity, speed of action may be reduced.

10. **Expected Results:** Generally, visual symptoms appear 2 - 4 days after application. When a rate range is given, the higher rate should be used:
    1. When weed or crop growth is dense.
    2. When the weeds are large and/or mature – i.e., advanced leaf stages and plant height.
    3. When environmental conditions are cool and dry.

11. **Effects of Rainfall:** If rainfall occurs within 4 hours of application, effectiveness may be reduced.

12. **Movement in Soil:** Liberty breaks down rapidly in the soil, which will effectively limit soil movement.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; sufficient data are not available to support such use. There are no cropping or rotational restrictions after application.

14. **Toxicity:** Acute oral LD_{50} (male rats) = 2,270 mg/kg; female rats = 1,730 mg/kg. Moderate dermal irritant. No allergic potential.

15. **Precautions, First Aid:** Keep out of reach of children and animals. This product may cause eye irritation. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Workers should not enter treated canola fields within 24 hours of treatment. Workers who must enter field within this time period should wear long sleeved shirt, long pants and chemical resistant gloves.

16. **Storage:** Do not store below freezing. If stored for one year or longer, shake well before using.

Lontrel *(clopyralid)*

Group 4

Manufacturer: Dow AgroSciences Canada Inc

1. **Formulations:** Solution; 360 g/L; 4.45 L jug.

2. **Registered Mixes:** Canola: Fusilade 250, Hoe-Grass 284, Poast Ultra; Flax: MCPA (amine or ester), Poast Ultra, Poast Ultra + MCPA (amine), Fusion, Select; Oats: MCPA (amine or ester); Wheat and Barley: 2,4-D or MCPA (amine or ester), Refine Extra + MCPA Ester 500, Refine Extra + 2,4-D Ester 600. SMART Canola: Odyssey; Wheat (spring only, not durum): Triumph Plus; Roundup Ready Canola: Roundup Original/Transorb.

Lontrel (cont'd)

Mixing restrictions: Add 1/2 amount of water to tank, add Lontrel, add more water, add other herbicide, then add remaining amount of water. **Mix order with Refine Extra:** Refine Extra, then Lontrel, then MCPA or 2,4-D, then surfactant.

3. **Crops:** Canola, sugar beets, wheat, oats, barley, flax, summerfallow, non-crop farmland, strawberries, timothy, creeping red fescue, Kentucky bluegrass, smooth bromegrass, reed canary grass, altari wild ryegrass, Russian wild ryegrass, slender wheat grass, meadow fescue, tall fescue, meadow foxtail, orchard grass, crested wheat grass, intermediate wheat grass and tall wheat grass*.

   * Forage production only.

   Underseeding: Not recommended for forage legumes.

4. **Weeds Controlled:** Alsike clover, wild buckwheat (6.5), scentless chamomile, golden rod, Canada thistle (7.2), tufted vetch, common groundsel, perennial sow-thistle (7.0) (top growth control), volunteer alfalfa.

5. **Weeds Suppressed:** Canada thistle (top control only at 170 mL/ac rate), sorrel, ox-eye daisy.

6. **When Used:** Canada thistle at rosette to pre-bud stage and actively growing. Other weeds at appropriate seedling stage and actively growing.

   Canola: 2 - 6 leaf stage.

   Flax: 5 - 10 cm high.

   Forage grasses: (Seedling) 2 - 4 leaf stage. (Established) Shot blade or in fall after harvest or early spring.

   Strawberry: Immediately after harvest and 7 - 10 days prior to mowing. Do not apply Lontrel after mid-August. Later application may cause crop damage resulting in reduced yield in the season following treatment.

   Sugar beets: Cotyledon to 8 leaf stage.

   Wheat, barley and oats: 3 leaf to flag leaf stages. When tank mixed with 2,4-D or MCPA, observe timing on their respective labels.

7. How to Apply:

With: Ground equipment.

Rate:

Crop	Rate	Weeds controlled
Canola, seedling, and established grasses, summerfallow and non-crop farmland*	170 mL/ac	Canada thistle (top growth control) for 6 - 8 weeks.
	227 mL/ac	Canada thistle (season-long control), wild buckwheat, scentless chamomile, perennial sow-thistle (top growth control), common groundsel.
	336 mL/ac	Canada thistle (season-long control and suppression into following season), wild buckwheat, scentless chamomile, perennial sow-thistle (top growth control), common groundsel.

* On summerfallow and non-crop farmland, 336 mL/ac rate only.

SMART Canola	170 mL/ac + Odyssey	Canada thistle top growth (6 - 8 weeks).
	227 mL/ac + Odyssey	Canada thistle (season-long control). See Odyssey label for other weeds controlled.
Roundup Ready canola	113 mL/ac + 506 mL/ac Roundup Original or Transorb	Season-long control of Canada thistle and wild buckwheat See Roundup Original or Transorb label for other weeds controlled.
Wheat, barley, oats*	113 mL/ac + MCPA or 2,4-D amine or ester	Canada thistle [top growth (6 - 8 weeks)] + MCPA or 2,4-D susceptible weeds.
	170 mL/ac + MCPA or 2,4-D amine or ester	Canada thistle (season-long control) + MCPA or 2,4-D susceptible weeds.
	85 mL/ac + 8 g/ac Refine Extra + 340 mL/ac MCPA Ester 500** or 85 mL/ac + 8 g/ac Refine Extra + 283 mL/ac 2,4-D Ester 600**	Perennial sow-thistle, wild buckwheat, volunteer canola, wild mustard, stinkweed, lady's-thumb. Seasonal control of Canada thistle and suppression of cleavers. (Refer to MCPA or 2,4-D Ester labels for additional weeds).
	170 mL/ac	Canada thistle [top growth (6 - 8 weeks)].
	227 mL/ac	Canada thistle (season-long control).

*Do not apply 2,4-D on oats due to probability of crop injury.

** Do not use these tank mixes on oats. Mix order: Refine Extra, then Lontrel, then MCPA or 2,4-D, then surfactant. When tank mixing with 2,4-D or MCPA, refer to rate and weeds controlled on respective labels.

Flax	170 mL/ac + MCPA amine or ester	Canada thistle (top growth control) + MCPA susceptible weeds.
	227 mL/ac	Canada thistle (season-long control), wild buckwheat, scentless chamomile perennial sow-thistle, common groundsel.
	336 mL/ac	Wild buckwheat, Canada thistle (season-long control and suppression into the following year), perennial sow-thistle (top growth control), scentless chamomile common groundsel.
Sugar beets	227 - 336 mL/ac	Canada thistle
Strawberries Renovation one application per year only	227 mLac	Canada thistle (season-long), tufted vetch, suppression of ox-eye daisy and sheep sorrel.
	336 mL/ac	Canada thistle (season-long and suppression into the following year), tufted vetch, ox-eye daisy and sheep sorrel. Early strawberry varieties may be more susceptible to injury and certain environmental stresses such as drought, flooding or severe overwintering conditions may increase the risk of injury to strawberries.

Water volume: 40 - 80 L/ac.

Pressure: 200 - 275 kPa.

7. How to Apply:

With: Ground equipment.

Rate:

[illegible]	[illegible]	[illegible]
Canola, seedling, and established grasses, summerfallow and non-crop farmland*	170 mL/ac	Canada thistle (top growth control) for 6 - 8 weeks.
	227 mL/ac	Canada thistle (season-long control), wild buckwheat, scentless chamomile, perennial sow-thistle (top growth control), common groundsel.
	336 mL/ac	Canada thistle (season-long control and suppression into following season), wild buckwheat, scentless chamomile, perennial sow-thistle (top growth control), common groundsel.

* On summerfallow and non-crop farmland, 336 mL/ac rate only.

SMART Canola	170 mL/ac + Odyssey	Canada thistle top growth (6 - 8 weeks).
	227 mL/ac + Odyssey	Canada thistle (season-long control). See Odyssey label for other weeds controlled.
Roundup Ready canola	113 mL/ac + 506 mL/ac Roundup Original or Transorb	Season-long control of Canada thistle and wild buckwheat See Roundup Original or Transorb label for other weeds controlled.
Wheat, barley, oats*	113 mL/ac + MCPA or 2,4-D amine or ester	Canada thistle [top growth (6 - 8 weeks)] + MCPA or 2,4-D susceptible weeds.
	170 mL/ac + MCPA or 2,4-D amine or ester	Canada thistle (season-long control) + MCPA or 2,4-D susceptible weeds.
	85 mL/ac + 8 g/ac Refine Extra + 340 mL/ac MCPA Ester 500** or 85 mL/ac + 8 g/ac Refine Extra + 283 mL/ac 2,4-D Ester 600**	Perennial sow-thistle, wild buckwheat, volunteer canola, wild mustard, stinkweed, lady's-thumb. Seasonal control of Canada thistle and suppression of cleavers. (Refer to MCPA or 2,4-D Ester labels for additional weeds).
	170 mL/ac	Canada thistle [top growth (6 - 8 weeks)].
	227 mL/ac	Canada thistle (season-long control).

*Do not apply 2,4-D on oats due to probability of crop injury.

** Do not use these tank mixes on oats. Mix order: Refine Extra, then Lontrel, then MCPA or 2,4-D, then surfactant. When tank mixing with 2,4-D or MCPA, refer to rate and weeds controlled on respective labels.

Flax	170 mL/ac + MCPA amine or ester	Canada thistle (top growth control) + MCPA susceptible weeds.
	227 mL/ac	Canada thistle (season-long control), wild buckwheat, scentless chamomile perennial sow-thistle, common groundsel.
	336 mL/ac	Wild buckwheat, Canada thistle (season-long control and suppression into the following year), perennial sow-thistle (top growth control), scentless chamomile common groundsel.
Sugar beets	227 - 336 mL/ac	Canada thistle
Strawberries Renovation one application per year only	227 mLac	Canada thistle (season-long), tufted vetch, suppression of ox-eye daisy and sheep sorrel.
	336 mL/ac	Canada thistle (season-long and suppression into the following year), tufted vetch, ox-eye daisy and sheep sorrel. Early strawberry varieties may be more susceptible to injury and certain environmental stresses such as drought, flooding or severe overwintering conditions may increase the risk of injury to strawberries.

Water volume: 40 - 80 L/ac.

Pressure: 200 - 275 kPa.

Lontrel (cont'd)

Nozzles: Flat fan nozzles preferred.

8. **Application Tips:** Do not use products containing 2,4-D on oats due to probability of crop injury. Rates of MCPA ester of 170 g active ingredients/ac or higher, or MCPA amine of 200 g active ingredient/ac may cause some delay in maturity of flax resulting in yield reduction. Make sure the sprayer tank has been thoroughly cleaned before Lontrel is mixed. Treat crops during warm weather when weeds are actively growing. Best results are obtained when Canada thistle is actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of Canada thistle may be severely reduced. sow-thistle plants emerging after spraying will not be controlled. Where contact herbicides are used, such as bromoxymil, that damage the leaves of the Canada thistle, apply Lontrel 14 days prior or after an interval of 14 days, which allows Canada thistle to recover and resume growth.

   Forage grasses: For control of the weeds listed on the label plus alsike clover, apply Lontrel at the rate of 170 - 336 mL/ac in 45 - 90 L/ac of water. Make one application per season by ground sprayer. For seedling grasses, apply at the 3 leaf stage and beyond. For established grasses, apply in the fall after harvest or early spring.

9. **How it Works:** Clopyralid is a systemic, hormone-type herbicide. It is absorbed by leaf and stem surfaces and is readily translocated. Maximum efficacy results from foliar application to young actively growing plants.

10. **Expected Results:** Herbicide symptoms on affected plants include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change color, first to dark green and then to yellow before turning brown as they die. Maximum effectiveness results from foliar applications to young actively growing plants. Death of weeds may not occur until 14 - 21 days after application. With the lowest rate of Lontrel on Canada thistle, some regrowth may occur by the end of the season, but this will not interfere with harvesting of the crop.

11. **Effects of Rainfall:** A rain-free period of 4 - 6 hours is required.

12. **Movement in Soil:** Clopyralid is somewhat soluble in water but is generally not mobile in soil under typical prairie conditions.

13. **Grazing and Cropping Restrictions:**

    Drift: Small amounts of drift may damage sensitive plants such as legumes.

    Succeeding crops: Fields previously treated with Lontrel can be seeded to barley, canola, forage grass crops, flax, mustard, oats, rapeseed, rye or wheat or can be summerfallowed the year after treatment. Do not seed to crops other than those listed above the year after treatment. For more cropping and use information, contact your Dow AgroSciences Canada Inc. representative.

    Grazing restrictions: Crops or areas treated with this product may be grazed immediately following treatment. Sugar beets – Do not apply within 90 days of harvest. Strawberry – P.H.I. = 200 days.

    Use of straw and manure from treated crops: Lontrel residues in straw may be harmful to susceptible plants. Do not use straw from treated crops for composting or mulching on susceptible broadleaf crops. Manure can be spread on fields that will be seeded to barley, flax, oats, canola (rapeseed), rye or wheat. Do not grow susceptible crops such as peas, beans, lentils, potatoes, sunflowers or other sensitive crops on land that has been mulched with straw containing Lontrel 360 residues within the last 12 months.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LC_{50} (rats) = greater than 2,000 mg/kg. Acute oral LD_{50} (bees) = greater than 100 μg/bee. Extremely low toxicity to fish.

15. **Precautions, First Aid: Flammable.** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store away from food, feedstuffs, fertilizer, seeds, insecticides, fungicides or other pesticides. Store in heated storage away from open flames or sparks. If frozen, warm slowly to room temperature and mix thoroughly before use.

Lorox/Linuron 480 *(linuron)*

Group 7

Manufacturer: **DuPont Canada Inc./United Agri Products**

1. **Formulations:** Dry Flowable; Lorox DF; 50%; 5.0, 10.0 kg jug; Dry Flowable, Toss-N-Go water soluble pouches, 50%, 2.0, 2.5 kg bag. Linuron 480, 480 g/L, 10L jug.
2. **Registered Mixes:** Estemine MCPA, MCPA amine 500 [barley, oats, wheat (spring)]; MCPA K-Salt [barley, wheat (spring)]; Target (refer to Target label for application rates) [barley, wheat (durum, spring)].

Mix instructions:

1. Fill tank with 1/4 required amount of water.
2. Turn on full agitation.
3. Add the required number of Lorox DF Toss-N-Go pouches. Maintain full agitation until pouches are completely dissolved and product is fully dispersed.
4. Continue filling tank with water and add tank mix partners (if applicable) in the following sequence:
   - Dry formulations,
   - Liquid formulations,
   - Emulsifiable concentrates and surfactants.
5. Continue with full agitation.
6. On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of the volume to be mixed.

3. **Crops:**

Lorox/Linuron 480		[illegible]	
asparagus (8.7)	established shelterbelts**	barley (8.6)	carrots (8.2)
carrots (8.2)	field corn (6.5)	durum wheat (8.2)	potatoes (8.7)
established fruit trees*	potatoes (8.7)	oats (8.9)	soybeans
		spring wheat (8.2)	

established – stock established at least 1 year.

* Apple, cherry, pear, plum.

** Ash (green), caragana, elm (American, Siberian), maple (Manitoba), pine (Scotch), poplar, spruce (Colorado, white), willow.

4. **Weeds Controlled:**

Lorox/Linuron 480 [illegible]		[illegible]	
annual sow-thistle	ragweed	common chickweed (7.4)	redroot pigweed (7.8)
common chickweed (9.0)	redroot pigweed (7.9)	corn spurry	shepherd's-purse
goosefoot (8.4)	shepherd's-purse	cow cockle (6.8)	smartweeds (7.0)
grass barnyard (8.3)	smartweeds (9.0)	flixweed	stinkweed (8.9)
knotweed	stinkweed (8.5)	hemp-nettle (7.5)	stork's-bill
lamb's-quarters (7.9)	wild buckwheat (8.5)	lamb's-quarters (8.9)	tartary buckwheat (7.9)
purslane (8.4)	wormseed mustard (8.9)	ragweed	wild buckwheat (7.5)

Underseeding: Forages not recommended.

5. **Weeds Suppressed:**

Lorox/Linuron 480: Foxtail [green (6.7), yellow].

Lorox/Linuron 480 + MCPA: Foxtail (green, yellow); thistle (Canada) (4.7).

Lorox/Linuron 480 *(linuron)*

Group 7

Manufacturer: **DuPont Canada Inc./United Agri Products**

1. **Formulations:** Dry Flowable; Lorox DF; 50%; 5.0, 10.0 kg jug; Dry Flowable, Toss-N-Go water soluble pouches, 50%, 2.0, 2.5 kg bag. Linuron 480, 480 g/L, 10L jug.
2. **Registered Mixes:** Estemine MCPA, MCPA amine 500 [barley, oats, wheat (spring)]; MCPA K-Salt [barley, wheat (spring)]; Target (refer to Target label for application rates) [barley, wheat (durum, spring)].

Mix instructions:

1. Fill tank with 1/4 required amount of water.
2. Turn on full agitation.
3. Add the required number of Lorox DF Toss-N-Go pouches. Maintain full agitation until pouches are completely dissolved and product is fully dispersed.
4. Continue filling tank with water and add tank mix partners (if applicable) in the following sequence:
   - Dry formulations,
   - Liquid formulations,
   - Emulsifiable concentrates and surfactants.
5. Continue with full agitation.
6. On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of the volume to be mixed.

3. **Crops:**

Lorox/Linuron 480		Lorox/Linuron 480 + MCPA Amine 500 (on cereals, do not use Lorox/Linuron alone)	Lorox DF
asparagus (8.7)	established shelterbelts**	barley (8.6)	carrots (8.2)
carrots (8.2)	field corn (6.5)	durum wheat (8.2)	potatoes (8.7)
established fruit trees*	potatoes (8.7)	oats (8.9)	soybeans
		spring wheat (8.2)	

established – stock established at least 1 year.

* Apple, cherry, pear, plum.

** Ash (green), caragana, elm (American, Siberian), maple (Manitoba), pine (Scotch), poplar, spruce (Colorado, white), willow.

4. **Weeds Controlled:**

Lorox/Linuron 480 (in crops other than cereals greater than 400 g/ac)		Lorox/Linuron 480 + MCPA Amine 500 (in cereals 210 g/ac)	
annual sow-thistle	ragweed	common chickweed (7.4)	redroot pigweed (7.8)
common chickweed (9.0)	redroot pigweed (7.9)	corn spurry	shepherd's-purse
goosefoot (8.4)	shepherd's-purse	cow cockle (6.8)	smartweeds (7.0)
grass barnyard (8.3)	smartweeds (9.0)	flixweed	stinkweed (8.9)
knotweed	stinkweed (8.5)	hemp-nettle (7.5)	stork's-bill
lamb's-quarters (7.9)	wild buckwheat (8.5)	lamb's-quarters (8.9)	tartary buckwheat (7.9)
purslane (8.4)	wormseed mustard (8.9)	ragweed	wild buckwheat (7.5)

Underseeding: Forages not recommended.

5. **Weeds Suppressed:**

Lorox/Linuron 480: Foxtail [green (6.7), yellow].

Lorox/Linuron 480 + MCPA: Foxtail (green, yellow); thistle (Canada) (4.7).

Lorox/Linuron 480 (cont'd)

6. When Used:

Weeds: 1 - 4 leaf.

Green foxtail: 1 - 3 leaf.

Crops:

Asparagus: Immediately after discing, before crop emergence, may be repeated after last cutting.

Carrots: Pre-emergent; after planting (at least 1 cm deep) but before crop emergence. Post-emergent: 2 or more fully developed true leaves (8 - 15 cm tall). Before annual grasses 5 cm tall, broadleaf weeds 15 cm tall. Pre- + post-emergent; observe limitations of pre- and post-emergent treatments. To prevent crop injury, treatments must be at least 2 weeks apart.

Cereals: 2 - 4 leaf. Must be tank mixed with MCPA amine when applying on wheat, oats and barley or MCPA-K when applying to wheat and barley. **Do not use Lorox/Linuron 480 alone on cereals.**

Chemical fallow: Sweep + MCPA Mix: when broadleaf weeds small and actively growing, annual grasses 2 - 4 leaf. Only 1/season, only in spring.

Corn: Lorox L; post-emergent, after corn is at least 38 cm tall, directed spray. Atrazine 80W Mix: pre-emergent, after planting at least 5 cm deep but before crop emergence. Do not spray over top of corn.

Fruit trees (established at least 10 years, peach 1 year): Directed spray under trees and bushes before buds open and before weeds 10 cm tall.

Potatoes: Pre-emergent: after planting (at least 5 cm deep) but before crop emergence. Before grassy weeds 5 cm tall, broadleaf weeds 15 cm tall. Treat after final hilling operation.

Shelterbelts (established): Stock planted for at least 1 year: directed spray **under trees** and bushes before buds open in spring, before weeds 10 cm tall.

7. How to Apply:

With: Aircraft or ground equipment.

Rate:

[illegible]	Time (crop)	Lorox/Linuron 480 (L/ac)	Tank mix
Asparagus	pre-emergent	1.4 - 1.8	NA*
Barley, oats, wheat (spring)	2 - 4 leaf	0.17 - 0.22	MCPA Amine 500: 345 - 445 mL/ac
Barley, wheat (spring)	2 - 4 leaf	0.17 - 0.22	MCPA K-Salt; 405 - 567 mL/ac
Carrots	pre-emergent	0.45 - 1.37	NA
Carrots	post-emergent	0.91 - 1.82	NA
Carrots	pre + post-emergent	0.45 - 0.91; 0.91 - 1.82	NA
Corn (2% or less soil O.M.)	pre-emergent	0.91	Atrazine 80W; 610 g/ac
Corn (2 - 5% soil O.M.)	pre-emergent	1.3	Atrazine 80W; 910 g/ac
Corn	post-emergent	0.97 - 1.82	Oil – water emulsion
Fruit trees	spring	3.6	Surfactant
Potatoes	pre-emergent	0.91 - 1.82	NA
Shelterbelts (established)	spring	1.82	NA

* NA – Not Applicable.

[illegible]	Time (crop)	Lorox DF (kg/ac)	Tank mix
Barley, oats, wheat (spring)	post-emergent	0.16 - 0.21	MCPA Amine 500; 345 - 445 mL/ac
Barley, wheat (spring)	post-emergent	0.16 - 0.21	MCPA K-Salt; 405 - 567 mL/ac
Carrots	pre-emergent	0.4 - 1.3	
Carrots	post-emergent	0.9 - 1.8	
Carrots	pre + post-emergent	0.4 - 0.9; 0.9 - 1.8	
Potatoes	pre-emergent	0.9 - 1.8 kg/ac	

Lorox/Linuron 480 (cont'd)

6. When Used:

Weeds: 1 - 4 leaf.

Green foxtail: 1 - 3 leaf.

Crops:

Asparagus: Immediately after discing, before crop emergence, may be repeated after last cutting.

Carrots: Pre-emergent; after planting (at least 1 cm deep) but before crop emergence. Post-emergent; 2 or more fully developed true leaves (8 - 15 cm tall). Before annual grasses 5 cm tall, broadleaf weeds 15 cm tall. Pre- + post-emergent; observe limitations of pre- and post-emergent treatments. To prevent crop injury, treatments must be at least 2 weeks apart.

Cereals: 2 - 4 leaf. Must be tank mixed with MCPA amine when applying on wheat, oats and barley or MCPA-K when applying to wheat and barley. **Do not use Lorox/Linuron 480 alone on cereals.**

Chemical fallow: Sweep + MCPA Mix; when broadleaf weeds small and actively growing, annual grasses 2 - 4 leaf. Only 1/season, only in spring.

Corn: Lorox L; post-emergent, after corn is at least 38 cm tall, directed spray. Atrazine 80W Mix; pre-emergent, after planting at least 5 cm deep but before crop emergence. Do not spray over top of corn.

Fruit trees (established at least 10 years, peach 1 year): Directed spray under trees and bushes before buds open and before weeds 10 cm tall.

Potatoes: Pre-emergent; after planting (at least 5 cm deep) but before crop emergence. Before grassy weeds 5 cm tall, broadleaf weeds 15 cm tall. Treat after final hilling operation.

Shelterbelts (established): Stock planted for at least 1 year; directed spray **under trees** and bushes before buds open in spring, before weeds 10 cm tall.

7. How to Apply:

With: Aircraft or ground equipment.

Rate:

[illegible]	[illegible]	[illegible]	Tank mix
Asparagus	pre-emergent	1.4 - 1.8	NA*
Barley, oats, wheat (spring)	2 - 4 leaf	0.17 - 0.22	MCPA Amine 500; 345 - 445 mL/ac
Barley, wheat (spring)	2 - 4 leaf	0.17 - 0.22	MCPA K-Salt; 405 - 567 mL/ac
Carrots	pre-emergent	0.45 - 1.37	NA
Carrots	post-emergent	0.91 - 1.82	NA
Carrots	pre + post-emergent	0.45 - 0.91; 0.91 - 1.82	NA
Corn (2% or less soil O.M.)	pre-emergent	0.91	Atrazine 80W; 610 g/ac
Corn (2 - 5% soil O.M.)	pre-emergent	1.3	Atrazine 80W; 910 g/ac
Corn	post-emergent	0.97 - 1.82	Oil – water emulsion
Fruit trees	spring	3.6	Surfactant
Potatoes	pre-emergent	0.91 - 1.82	NA
Shelterbelts (established)	spring	1.82	NA

* NA – Not Applicable.

[illegible]	[illegible]	[illegible]	[illegible]
Barley, oats, wheat (spring)	post-emergent	0.16 - 0.21	MCPA Amine 500; 345 - 445 mL/ac
Barley, wheat (spring)	post-emergent	0.16 - 0.21	MCPA K-Salt; 405 - 567 mL/ac
Carrots	pre-emergent	0.4 - 1.3	
Carrots	post-emergent	0.9 - 1.8	
Carrots	pre + post-emergent	0.4 - 0.9; 0.9 - 1.8	
Potatoes	pre-emergent	0.9 - 1.8 kg/ac	

Water volume: Asparagus, potatoes: 120 L/ac. Carrots: 90 - 135 L/ac. Cereals: 40 L/ac minimum. Corn: pre-emergent 90 - 135 L/ac; post-emergent 70 - 140 L/ac. Fruit trees: 160 - 240 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended. 50 mesh line strainers and screens.

Incorporation: Not applicable.
Must be tank mixed with MCPA amine when applying to wheat, oats and barley or MCPA-K when applying to wheat and barley.

8. **Application Tips: Do not use on sandy or coarse-textured soils, low in organic matter, as crop injury may result.** Do not use when crops are under drought stress. Fruit trees: avoid contact with fruit, foliage and green bark with spray or drift as injury may result.

9. **How it Works:** A systemic herbicide absorbed by leaves and roots. Yellowing (chlorosis), stunting and finally death occurs 10 - 14 days after treatment.

10. **Expected Results:**

    Weeds: Yellowing starts 7 - 10 days after application. Effect greatest under excellent growing conditions. Weed control will vary depending on species, time of application and growing conditions.

    Crop: A slight yellowing of crop, leaf tip and leaf margin burn may be seen 7 - 10 days after application. Crop recovers within 14 - 18 days. Crop injury can occur if applied during period of high heat.

11. **Effects of Rainfall:** Heavy rainfall within 2 hours may decrease activity. Pre-emergent treatment requires rainfall or irrigation for activation. Carrots, corn or potatoes may be severely injured if unusually heavy rains follow application.

12. **Movement in Soil:** Movement by leaching is least in soils high in clay and/or organic matter; greatest in sand.

13. **Grazing and Cropping Restrictions:** Do not apply post-emergent corn treatment within 60 days of harvest. 25% carry over into next growing season if rates are 1.8 L/ac or higher. Do not graze or cut for hay; there are not sufficient data available to support such use.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (4,000). Very toxic to fish. Non-toxic to bees.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Lorox/Linuron 480: Store in a heated area. Do not freeze as settling may occur. If frozen, thoroughly mix to resuspend. Lorox DF: Store in a dry place.
    Note: Similar product is Afolan F.

Mataven L *(flamprop-methyl)*

Group 25

Manufacturer: **Cyanamid Crop Protection**

CAUTION POISON

WARNING CORROSIVE

1. **Formulations:** Emulsifiable Concentrate; 52.5 g/L; 2 x 10 L pack.

2. **Registered Mixes:**

   Mixing Instructions: Mataven L Only: add 1/2 the required amount of water, add Mataven L, agitate, then add rest of water.

Mataven L (cont'd)

3. **Crops:**

canary seed (8.7)
triticale (8.7)
wheat (durum, spring, winter) (except Garnet, Selkirk)(8.7)
sunflowers (9.0)

Seed production only,* establishment year only
alfalfa (8.3)
bromegrass (8.4)
clover, red (8.0)
fescue [creeping red (8.3), meadow (7.2)]
milk vetch, cicer (8.2)
ryegrass, Russian wild (8.1)
sainfoin (8.6)
trefoil, bird's-foot
wheatgrass [crested (7.6), intermediate (7.9)]

* Do not graze or harvest for forage in the year of treatment.

4. **Weeds Controlled:** Wild oats (8.0).

5. **Weeds Suppressed:** None.

6. **When Used:** 3 leaf to shot blade stage of wild oats. Wild oats at 2 leaf stage and younger may escape control and may grow to maturity. Apply prior to the emergence of the flag leaf stage of the crop. Apply tank mix when wild oats in 3 - 4 leaf stage.

7. **How to Apply:**

With: Aircraft or ground equipment.

Rate: 2 L/ac.

Forage grasses: 2.0 - 3.0 L/ac. High rate without a companion crop; low rate with companion crop for which Mataven L is registered.

Sunflowers: 2.0 - 2.6 L/ac.

Water volume: Aircraft: 8 L/ac minimum; Ground: 40 L/ac.

Pressure: Ground 300 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** Best results will be obtained when the majority of wild oats are at the 3 - 4 leaf stage, but before the flag leaf stage. Allow 4-day interval between the application of Mataven L and the use of MCPA, bromoxynil, or bromoxynil + MCPA; and an interval of 7 days with the use of 2,4-D or dicamba formulations. The 40 L/ac spray volume will provide better control of wild oats, especially where there is a heavy crop canopy or dense growth of wild oats. Direct spray pattern 45° forward to enhance spray penetration. Agitation required to re-emulsify spray if allowed to stand for several hours.

9. **How it Works:** A systemic, absorbed through leaves and translocated to the growing point. Cell elongation is inhibited, and cell initiation and division is impaired. Wild oats are unable to compete with the crop because of stunting or death.

10. **Expected Results:** Initially, a dark blue-green color appears 10 days after spraying, then the wild oats turn yellow and brown. Wild oats in the 1 - 2 leaf stage at application may often appear controlled but may escape and grow to maturity. Will be small, stunted plants with few shrivelled seeds.

11. **Effects of Rainfall:** Rainfall within 2 hours of application will reduce effectiveness.

12. **Movement in Soil:** Half-life of 1 - 2 weeks in sandy loam, clay and medium loam; 2 - 3 weeks in peat soil.

13. **Grazing and Cropping Restrictions:**

Drift: Drift potential is low. Oats would be the most seriously affected crop.

Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

Crop use after hail: Do not graze or feed to livestock.

Succeeding crops: No restrictions.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (1210), Mataven L (3,900). Eye irritant. Non-toxic to bees.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. Storage: Heated storage only.

MCPA *(amine, ester, K and Na-salts)*

Group 4

Manufacturer: **Numerous Manufacturers**

CAUTION POISON

1. Formulations:

Liquid: MCPA Amine (500, 80), Estemine MCPA; 500 g/L; 2 x 10 L jugs. MCPA Potassium (K) salt: MCPA K; 400 g/L.

Emulsifiable concentrate: MCPA Ester (500, 80); 500 g/L.

Solution: Sodium (Na) salt: MCPA Sodium (Na) 300 g/L. 2 x 10 L, 20 L containers.

Solventless Ester: SEE MCPA.

2. Registered Mixes: Tank mix crops in brackets. Check the labels.

MCPA Amine: Afolan F (barley, oats, wheat); Banvel (barley, canary seed, oats, spring rye, wheat); Buctril M (barley, oats, wheat); Hoe-Grass II (barley: **not** Betzes or Klages, spring rye, triticale, wheat); Lorox L (barley, oats, wheat); NaTA (barley, flax, oats, peas); Sencor (wheat); Sweep (chemical fallow); Pardner (barley, oats, wheat).

MCPA Ester: Avenge (barley, canary seed, Avenge wheat varieties); Avenge + Pardner (barley, Avenge wheat varieties); [Buctril M, Hoe-Grass II (see amine)]; Stampede 360 (wheat); [Sweep, Pardner (see amine)], Poast Ultra (flax).

MCPA Potassium (K) Salt: Banvel, Buctril M, Lorox L, Pardner.

MCPA Sodium (Na) Salt: Buctril M.

Note: Some formulations can be mixed with liquid fertilizers (28-0-0).

Mixing restrictions: Ensure that the proper formulation of MCPA, **rate** and order of mixing are used when tank mixing.

3. Crops:

MCPA Amine	MCPA Ester	MCPA K-Salt	MCPA Na-Salt
Asparagus, barley (8.7), corn, flax (8.0), grasses (estab.), non-crop areas, oats (9.0), pasture (grass, estab.), peas [field (7.8), processing], rangeland, rye (fall, spring), turf (estab.), wheat [durum, hard red spring (8.7), winter (8.9)], red clover (seedling, estab.)	Asparagus, barley (8.0), flax, grasses (estab.), non-crop areas, oats (9.0), pasture (grass, estab.), rangeland, rye (fall, spring), wheat [durum, hard red spring (8.7), winter (8.9)]. **Underseeding:** Do not use on crops underseeded to legumes.	Barley, corn, flax, oats, rye (fall, spring), wheat (durum, hard red spring, winter).	Barley, corn, flax, non-crop areas, oats, pasture (grass, estab.), peas [field (7.8), processing], rye (fall, spring), turf (estab.), wheat (durum, hard red spring, winter).

estab. = established

16. Storage: Heated storage only.

MCPA *(amine, ester, K and Na-salts)*

Group 4

Manufacturer: **Numerous Manufacturers**

CAUTION POISON

1. Formulations:

Liquid: MCPA Amine (500, 80), Estemine MCPA; 500 g/L; 2 x 10 L jugs. MCPA Potassium (K) salt: MCPA K; 400 g/L.

Emulsifiable concentrate: MCPA Ester (500, 80); 500 g/L.

Solution: Sodium (Na) salt: MCPA Sodium (Na) 300 g/L. 2 x 10 L, 20 L containers.

Solventless Ester: SEE MCPA.

2. Registered Mixes: **Tank mix crops in brackets. Check the labels**.

MCPA Amine: Afolan F (barley, oats, wheat); Banvel (barley, canary seed, oats, spring rye, wheat); Buctril M (barley, oats, wheat); Hoe-Grass II (barley: **not** Betzes or Klages, spring rye, triticale, wheat); Lorox L (barley, oats, wheat); NaTA (barley, flax, oats, peas); Sencor (wheat); Sweep (chemical fallow); Pardner (barley, oats, wheat).

MCPA Ester: Avenge (barley, canary seed, Avenge wheat varieties); Avenge + Pardner (barley, Avenge wheat varieties); [Buctril M, Hoe-Grass II (see amine)]; Stampede 360 (wheat); [Sweep, Pardner (see amine)], Poast Ultra (flax).

MCPA Potassium (K) Salt: Banvel, Buctril M, Lorox L, Pardner.

MCPA Sodium (Na) Salt: Buctril M.

Note: Some formulations can be mixed with liquid fertilizers (28-0-0).

Mixing restrictions: Ensure that the proper formulation of MCPA, **rate** and order of mixing are used when tank mixing.

3. Crops:

MCPA Amine	MCPA Ester	MCPA K-Salt	MCPA Na-Salt
Asparagus, barley (8.7), corn, flax (8.0), grasses (estab.), non-crop areas, oats (9.0), pasture (grass, estab.), peas [field (7.8), processing], rangeland, rye (fall, spring), turf (estab.), wheat [durum, hard red spring (8.7), winter (8.9)], red clover (seedling, estab.)	Asparagus, barley (8.0), flax, grasses (estab.), non-crop areas, oats (9.0), pasture (grass, estab.), rangeland, rye (fall, spring), wheat [durum, hard red spring (8.7), winter (8.9)]. **Underseeding**: Do **not** use on crops underseeded to legumes.	Barley, corn, flax, oats, rye (fall, spring), wheat (durum, hard red spring, winter).	Barley, corn, flax, non-crop areas, oats, pasture (grass, estab.), peas [field (7.8), processing], rye (fall, spring), turf (estab.), wheat (durum, hard red spring, winter).

estab. = established

MCPA (cont'd)

4. Weeds Controlled:

MCPA Amine	MCPA Ester	MCPA K-Salt	MCPA Na-Salt
Group I burdock, sweet clover, cocklebur, flixweed (7.1), kochia, lamb's-quarters (7.2), prickly lettuce, ball mustard, hare's-ear mustard, Indian mustard, tumble mustard, wild mustard (8.5), wormseed mustard, Russian pigweed, wild radish, common ragweed, false ragweed, giant ragweed, shepherd's-purse, thyme-leaved spurge, stinkweed (7.5), wild sunflower, vetch.	**Group I** burdock, sweet clover, cocklebur, flixweed, kochia, lamb's-quarters (8.4), prickly lettuce, ball mustard, hare's-ear mustard, Indian mustard, tumble mustard, wild mustard (5.7), wormseed mustard, Russian pigweed, wild radish, common ragweed, false ragweed, giant ragweed, shepherd's-purse, stinkweed (8.3), wild sunflower, vetch.	**Group I** bluebur, burdock, cocklebur, flixweed, kochia, lamb's-quarters (8.5), prickly lettuce, ball mustard, hare's-ear mustard, Indian mustard, tumble mustard, wormseed mustard, wild mustard, Russian pigweed, wild radish, common ragweed, false ragweed, giant ragweed, shepherd's-purse, stinkweed (8.3), wild sunflower.	**Group I** burdock, cocklebur, flixweed, lamb's-quarters (8.5), prickly lettuce, ball mustard, hare's-ear mustard, Indian mustard, tumble mustard, wild mustard, wormseed mustard, Russian pigweed, wild radish, common ragweed, false ragweed, giant ragweed, shepherd's-purse, stinkweed (8.3), wild sunflower.
Group II bluebur, American dragonhead, hairy galinsoga, oak-leaved goosefoot, dog mustard, tansy mustard, common peppergrass, field peppergrass, redroot pigweed (6.5), tumble pigweed, pineappleweed, purslane, tall buttercup.	**Group II** bluebur, hairy galinsoga, oak-leaved goosefoot, dog mustard, tansy mustard, common peppergrass, field peppergrass, purslane.	**Group II** dandelion, curled dock, goat's-beard, dog mustard, tansy mustard, field peppergrass, prostrate pigweed, redroot pigweed, purslane, annual smartweed, annual sow-thistle, biennal wormwood.	**Group II** bluebur, tall buttercup, curled dock, hairy galinsoga, goat's-beard, spear-leaved goosefoot, dog mustard, tansy mustard, peppergrass, redroot pigweed, purslane, annual smartweed.

5. Weeds Suppressed: (includes top growth control)

MCPA Amine	MCPA Ester	MCPA K-Salt	MCPA Na-Salt
Group I horsetail (field), plantain (common).	**Group I** horsetail (field), plantain (common).	**Group I** horsetail (field), vetch.	**Group I** horsetail (field)
Group II bindweeds (field, hedge), buckwheats [tartary wild (3.6)], dandelion, dock (curled), goat's-beard, gumweed, hemp-nettle (4.2), hoary cress, lettuce (blue), smartweeds (annual)(4.3), sow-thistles (annual, perennial), spurge (leafy), thistle [Canada (5.8)], wormwood (biennial)	**Group II** bindweeds (field, hedge), buckwheats [tartary (4.3), wild (4.7)], dandelion, dock (curled), goat's-beard, gumweed, hemp-nettle (5.8), hoary cress, lettuce (blue), pigweed [redroot (4.4)], smartweeds (annual), sow-thistles (annual, perennial), spurge (leafy), thistle [Canada (4.5)], wormwood (biennial).	**Group II** bindweeds (field, hedge), buckwheats (tartary, wild), goosefoot, gumweed, hemp-nettle, hoary cress, lettuce (blue), sow-thistle (perennial), spurge, (leafy), thistle (Canada).	**Group II** bindweeds (field, hedge), buckwheats (tartary, wild), goosefoot, gumweed, hemp-nettle, hoary cress, knapweed (Russian), lettuce (blue), sow-thistles (annual, perennial), spurge (leafy), thistle (Canada), wormwood (biennial).

6. When Used:

Crop	MCPA Amine	MCPA Ester	MCPA K-Salt	MCPA Na-Salt
Asparagus	After cultivation just before spears appear. May repeat at end of cutting season.	After cultivation just before spears appear. May repeat at end of cutting season.	—	—
Barley, rye, wheat (spring)	3 leaf expanded to early flag leaf; milk stage to full maturity.	3 leaf expanded to early flag leaf; milk stage to full maturity.	3 leaf expanded to early flag leaf.	3 leaf expanded to early flag leaf.
Corn	Before 15 cm tall; after 15 cm, directed spray.	—	Before 15 cm tall; after 15 cm, directed spray.	Before 15 cm tall; after 15 cm, directed spray.
Flax	5 cm to early pre-bud.	5 cm to early pre-bud.	5 cm to early pre-bud.	5 cm to early pre-bud.
Grasses (estab.)	Early summer.	Early summer.	—	—
Oats	Up to flag leaf	Up to flag leaf	2 - 6 leaves	Up to flag leaf
Pea (field, processing)	2 - 5 nodes	—	—	2 - 5 nodes
Rye (fall), wheat (winter).	Before flag leaf in spring.	Before flag leaf in spring.	Before flag leaf in spring.	Before flag leaf in spring.
Seedling red clover (for seed)	1 - 3 trifoliate stage.	—	—	—
Red clover (for seed) (estab.)	Breaking of dormancy in spring up to 7.5 cm	—	—	—
Seedling red clover for forage	1 - 3 trifoliate in year of establishment	—	—	—

estab. = established

7. How to Apply:

With: Aircraft or ground equipment.

Rate: MCPA alone. MCPA rate for tank mixes may be different.

Crop	MCPA Amine	MCPA Ester	MCPA K-Salt	MCPA Na-Salt
Asparagus	1.4 L/ac	1.4 L/ac	NRF*	NRF
Barley, oats, rye, wheat (Not underseeded)				
(Group I weeds).	280 - 445 mL/ac	280 - 445 mL/ac	375 - 505 mL/ac	485 - 710 mL/ac
(Group II weeds)	505 - 710 mL/ac	505 - 710 mL/ac	610 - 810 mL/ac	810 - 1200 mL/ac
Corn	Up to 445 mL/ac	NRF	505 mL/ac	Up to 705 mL/ac
Flax	Up to 445 mL/ac	Up to 445 mL/ac	605 - 850 mL/ac	Up to 705 mL/ac
Non-crop areas	1.0 - 2.0 L/ac	1.6 L/ac	NRF	up to 2.85 L/ac
Pasture, rangeland, turf.	1.1 - 1.7 L/ac	0.6 - 1.1 L/ac	NRF	up to 2.85 L/ac
Peas	135 - 220 mL/ac	NRF	NRF	380 - 505 mL/ac
Red clover (seedling & estab.)	225 mL/ac	—	—	—

* No Recommendation Found.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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MCPA (cont'd)

Rate: MCPA used in tank mixes, if different from MCPA rate alone. Check the labels before you mix.

Tank mix	MCPA Amine	MCPA Ester	MCPA K-Salt	MCPA Na-Salt
Buctril M	223 mL/ac	223 mL/ac	278 mL/ac	NR
Hoe-Grass II	28 mL/ac	28 mL/ac	NR	NR

* NR – Not Recommended.

Water volume: Aircraft: 12 L/ac minimum. Ground: 40 L/ac.
Peas: 70 L/ac minimum (amine), 60 L/ac minimum (Na Salt).
Pasture, rangeland, turf: 180 L/ac.

Pressure: Air: 235 kPa or less; Ground: 200 - 275 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:**
   Recommendations vary from label to label, read label of product used. Do not spray when air temperature is above 27°C. Extremely hard water may reduce performance or cause problems in spraying the product. Do not use on bentgrasses. Always use recommended volume of water when applying on peas to avoid crop damage.

9. **How it Works:** A systemic, absorbed by leaf and stem surfaces and translocated to the actively growing regions. MCPA disrupts cell division, causing abnormal growth response, thereby affecting respiration and food reserves.

10. **Expected Results:**

    Weeds: Weeds start to twist between 2 - 20 days after spraying, depending on weather conditions, formulation and weeds. Following the twisting and bending, plants will turn brown and then die. Only emerged weeds will be controlled.

    Crops: Yellowing and thinning of the crop may be noticed if higher than recommended rates are used. **Poor results may occur if** extremely hard water is used or incorrect rate of MCPA is used in tank mixes.

11. **Effects of Rainfall:** Rain within 2 hours of application will decrease activity.

12. **Movement in Soil:** Readily leached from soil. Longer residual in dry soil.

13. **Grazing and Cropping Restrictions:**

    Drift: Danger from drift with amine and salts is lower than from esters.

    Grazing restrictions: Do not graze or cut for greenfeed until 7 days after spraying. Seedling red clover for forage: Do not graze or cut for green feed in the first year.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700 - 880). Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** If frozen, warm to 5°C and mix well before using.

MCPA (cont'd)

Rate: MCPA used in tank mixes, if different from MCPA rate alone. Check the labels before you mix.

Tank mix	MCPA Amine	MCPA Ester	MCPA K-Salt	MCPA Na-Salt
Buctril M	223 mL/ac	223 mL/ac	278 mL/ac	NR
Hoe-Grass II	28 mL/ac	28 mL/ac	NR	NR

* NR – Not Recommended.

Water volume: Aircraft: 12 L/ac minimum. Ground: 40 L/ac.
Peas: 70 L/ac minimum (amine), 60 L/ac minimum (Na Salt).
Pasture, rangeland, turf: 180 L/ac.

Pressure: Air: 235 kPa or less; Ground: 200 - 275 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:**
Recommendations vary from label to label, read label of product used. Do not spray when air temperature is above 27°C. Extremely hard water may reduce performance or cause problems in spraying the product. Do not use on bentgrasses. Always use recommended volume of water when applying on peas to avoid crop damage.

9. **How it Works:** A systemic, absorbed by leaf and stem surfaces and translocated to the actively growing regions. MCPA disrupts cell division, causing abnormal growth response, thereby affecting respiration and food reserves.

10. **Expected Results:**

    Weeds: Weeds start to twist between 2 - 20 days after spraying, depending on weather conditions, formulation and weeds. Following the twisting and bending, plants will turn brown and then die. Only emerged weeds will be controlled.

    Crops: Yellowing and thinning of the crop may be noticed if higher than recommended rates are used. **Poor results may occur if** extremely hard water is used or incorrect rate of MCPA is used in tank mixes.

11. **Effects of Rainfall:** Rain within 2 hours of application will decrease activity.

12. **Movement in Soil:** Readily leached from soil. Longer residual in dry soil.

13. **Grazing and Cropping Restrictions:**

    Drift: Danger from drift with amine and salts is lower than from esters.

    Grazing restrictions: Do not graze or cut for greenfeed until 7 days after spraying. Seedling red clover for forage: Do not graze or cut for green feed in the first year.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700 - 880). Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** If frozen, warm to 5°C and mix well before using.

Mecoprop/Compitox *(mecoprop)*

Group 4

CAUTION POISON

Manufacturer **United Agri Products/Nufarm**

1. **Formulations:** Liquid; Compitox; 150 g/L; 4 L, 8 L containers, Mecoprop; 150 g/L; 10 L containers.
2. **Registered Mixes:** MCPA for turf only.
3. **Crops:** Barley (9.0), lawns, oats, turf, wheat [durum, spring)(8.7)].

   Underseeding: Not recommended.
4. **Weeds Controlled:**

   black medic (Mecoprop only)
   buttercup
   chickweed (7.6)
   cleavers
   corn spurry (7.3)
   ground ivy
   lamb's-quarters
   plantain
   volunteer clover
   wild mustard
5. **Weeds Suppressed:** Canada thistle [top growth control (4.6)].
6. **When Used:**

   Crop: 3 leaf to early flag leaf.

   Weeds: 2 - 4 leaf and mature plants.
7. **How to Apply:**

   With: Ground equipment.

   Rate: Cereals: 2.2 - 2.8 L/ac. Lawns, turf: 2.2 - 3.4 L/ac. Low rate for seedling weeds. High rate for mature weeds.

   Water volume: Cereals: 80 - 120 L/ac. Lawns, turf: 80 - 160 L/ac.

   Pressure: 300 kPa.

   Nozzles: Flat fan recommended.
8. **Application Tips:** Recommended water volume is essential for optimum weed control. Cold weather and drought may cause a delay in weed control action. Do not spray bentgrass when temperatures are above 27°C, particularly if high rates are used.
9. **How it Works:** A systemic that disrupts the plant's translocation system causing the accumulation of plant food in the shoots and subsequent starvation of the roots.
10. **Expected Results:**

    Weeds: Leaf curling and stem twisting should be visible within 4 - 5 days after spraying. Weeds should be dead within 3 - 4 weeks of application.

    Crop: Deformed heads, missing florets and twisted awns could result if recommendations are not followed or if crop is under stress conditions.
11. **Effects of Rainfall:** Rain within 4 - 6 hours will reduce effectiveness.
12. **Movement in Soil:** Readily leached from soils. Longer residual in dry soil.
13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Drift: Danger of vapor drift is low.

    Succeeding crops: No restrictions.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,060).

Mecoprop/Compitox (cont'd)

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store above 0°C. If stored for 1 year or longer, shake well before using.

Muster *(ethametsulfuron-methyl)*

Group 2

Manufacturer: **DuPont Canada Inc.**

CAUTION POISON

1. **Formulations:**

   Dry flowable: 75%; Toss-N-Go 320 grams, (4 x 80 gram) water soluble pouches.

2. **Registered Mixes:** Assure II, Poast Ultra.

   Surfactants: Agral 90, Agsurf, Citowett Plus.

   Mixing instructions:
   1. Fill tank with 1/2 - 3/4 amount of required water with agitator running.
   2. Add the required amount of Muster Toss-N-Go and ensure it is completely in suspension.
   3. Add remainder of water, then add surfactant. Continuous agitation is required.
   4. For tank mixtures with Assure II or Poast Ultra: Ensure the Muster Toss-N-Go pouches have completely dissolved, then add the required amount of Assure II or Poast Ultra with agitator running. Once the herbicide is completely in suspension, slowly add the required amount of partner surfactant (Assure II/Sure-Mix, Poast Ultra/Merge). Additional surfactant is not required.

3. **Crops:** Canola (spring), condiment mustard (Brown and Oriental Mustards only).
4. **Weeds Controlled:**

Muster 8 g/ac	Muster 12 g/ac
flixweed (spring seedlings)(8.3)	flixweed
green smartweed (7.3)	hemp-nettle
hemp-nettle (8.1)	green smartweed (7.7)
wild mustard (8.0)	stinkweed (7.9*)
	wild mustard

* Controlled at 8 g/ac of Muster when tank mixed with Assure II + Hi-Mix or Poast Ultra + Merge.

5. **Weeds Suppressed:**

Muster 8 g/ac	Muster 12 g/ac
stinkweed (7.1)	pigweed, redroot (7.0)

6. **When Used:** Canola: 2 leaf to the beginning of bolting. Condiment mustards: 4 leaf to late rosette stage. (For optimum control, apply Muster at the cotyledon to 6 leaf stage of the target weeds. For stinkweed, apply Muster when actively growing: 1 - 4 leaf stage).
7. **How to Apply:**

   With: Ground equipment only. Do not apply by air.

Mecoprop/Compitox (cont'd)

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store above 0°C. If stored for 1 year or longer, shake well before using.

Muster *(ethametsulfuron-methyl)*

Group 2

Manufacturer **DuPont Canada Inc**

CAUTION POISON

1. **Formulations:**

   Dry flowable: 75%; Toss-N-Go 320 grams, (4 x 80 gram) water soluble pouches.
2. **Registered Mixes:** Assure II, Poast Ultra.

   Surfactants: Agral 90, Agsurf, Citowett Plus.

   Mixing Instructions:
   1. Fill tank with 1/2 - 3/4 amount of required water with agitator running.
   2. Add the required amount of Muster Toss-N-Go and ensure it is completely in suspension.
   3. Add remainder of water, then add surfactant. Continuous agitation is required.
   4. For tank mixtures with Assure II or Poast Ultra: Ensure the Muster Toss-N-Go pouches have completely dissolved, then add the required amount of Assure II or Poast Ultra with agitator running. Once the herbicide is completely in suspension, slowly add the required amount of partner surfactant (Assure II/Sure-Mix, Poast Ultra/Merge). Additional surfactant is not required.
3. **Crops:** Canola (spring), condiment mustard (Brown and Oriental Mustards only).
4. **Weeds Controlled:**

Muster 8 g/ac	Muster 12 g/ac
flixweed (spring seedlings)(8.3)	flixweed
green smartweed (7.3)	hemp-nettle
hemp-nettle (8.1)	green smartweed (7.7)
wild mustard (8.0)	stinkweed (7.9*)
	wild mustard

* Controlled at 8 g/ac of Muster when tank mixed with Assure II + Hi-Mix or Poast Ultra + Merge.

5. **Weeds Suppressed:**

Muster 8 g/ac	Muster 12 g/ac
stinkweed (7.1)	pigweed, redroot (7.0)

6. **When Used:** Canola: 2 leaf to the beginning of bolting. Condiment mustards: 4 leaf to late rosette stage. (For optimum control, apply Muster at the cotyledon to 6 leaf stage of the target weeds. For stinkweed, apply Muster when actively growing: 1 - 4 leaf stage).
7. **How to Apply:**

   With: Ground equipment only. Do not apply by air.

Rate:

Muster alone: 8 - 12 g/ac (apply with 2.0 L of surfactant in 1000 L of spray volume). Not more than 8 g/ac on Brown or Oriental Mustards.

Muster + Assure II: 8 - 12 g/ac + 0.15 - 0.2 L/ac + 5 L/1000 L Sure-Mix. Do not apply in combination with other pesticides.

Muster + Poast Ultra: 8 - 12 g/ac + 325 - 770 ml/ac. (Use surfactant as outlined on Poast Ultra label).

Water volume: 40 L/ac.

Pressure: 210 - 275 kPa.

Nozzle: Flat fan recommended. Use 50 mesh screens or larger (metal or nylon).

Sprayer clean up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Muster when cleaning equipment.

1. Drain tank and flush tank, boom and hoses with clean water for a minimum of ten minutes. Visually inspect tank to assure removal of all visible residues of Muster. If necessary, repeat step 1.
2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, and then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes **with agitation**. Again, flush the hoses, boom and nozzles with the cleaning solution and drain tank.
3. Remove the nozzles and screens, and clean separately in a bucket containing cleaning agent and water.
4. Repeat Step 2.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** For optimum weed control, apply Muster at the cotyledon to 6 leaf stage of the target weeds. For best control of stinkweed, apply Muster plus surfactant on actively growing emerged stinkweed in the 1 - 4 leaf stage. When very high weed seedling population occurs, larger seedlings may interfere with coverage of smaller seedlings and control may be reduced. Regrowth may also occur if crop competitiveness is reduced by thin stands and/or reduced vigour.
9. **How it Works:** Absorbed by foliage and roots. Inhibits cell elongation.
10. **Expected Results:** Weed growth stops almost immediately. **Poor results may be expected if** improper mixing, timing or coverage, or when weeds are under drought stress or moisture stress.
11. **Effects of Rainfall:** If rain occurs soon after application, control may be reduced. 4 - 6 hours of dry weather are needed to allow Muster to be absorbed by weed foliage. Environmental conditions that slow the drying of Muster on the foliage, such as high relative humidity, cool air temperature or cloud cover, may increase the time required.
12. **Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral-to-acidic conditions.
13. **Grazing and Cropping Restrictions:** Do not graze or feed crop to livestock within 60 days of treatment. Do not harvest within 60 days of treatment.

    Minimum crop rotation guidelines:
    Minimum interval is that from the last application of Muster to date of planting the rotational crop.

    Interval prior to planting (months after application):
    10 months – spring wheat, durum wheat, barley, flax, oats.
    22 months – alfalfa, canary grass, canola, drybeans, fababeans, fescue, lentils, peas, red clover, tame mustard. All other crops, field bioassy at 22 months.
    * Wherever Muster is used on land previously treated with Ally herbicide, read the rotational guidelines on both labels and follow the label with the longest interval stated for your situation.

14. **Toxicity:** Low acute mammaliam toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000).
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

Muster (cont'd)

16. **Storage:** Store in a cool, dry place.
17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Odyssey, Pursuit, Unity, Refine Extra, the DF component of Laser DF and the Plus component of Champion Plus and Triumph Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Odyssey, Pursuit, Unity, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Muster Gold *(quizalofop-ethyl + ethametsulfuron-methyl)*

Group 1,2

Manufacturer: **DuPont Canada Inc.**

CAUTION POISON

1. **Formulations:** Muster (Dry flowable): 75%; 160 grams, (2 x 80 grams) water soluble pouches. Assure (Emulsifiable Concentrate): 96 g/L; 1 x 8 L + 1 jug Sure-Mix.
2. **Registered Mixes:** None.

   Mixing instructions:
   1. Fill tank 1/2 - 3/4 amount of required water with agitator running.
   2. Add the required amount of Muster Toss-N-Go and ensure it is completely in suspension.
   3. Add required amount of Assure and agitate.
   4. Add remainder of water, then add the Sure-Mix. Continuous agitation is required.
3. **Crops:** Canola (spring).
4. **Weeds Controlled:**

   barnyard grass
   flixweed (spring seedlings)
   green foxtail
   green smartweed
   hemp-nettle
   stinkweed
   volunteer barley
   volunteer wheat
   wild mustard
   wild oats
5. **Weeds Suppressed:** Quackgrass.
6. **When Used:**

   Crop: from 2 leaf to beginning of bolting.

   Annual grassy weeds: 2 leaf to early tillering stage.

   Quackgrass: 2 - 6 leaf stage. For optimum control, apply Muster Gold at the cotyledon to 6 leaf stage of the target broadleaf weeds.

   Stinkweed, when actively growing: 1 - 4 leaf stage.
7. **How to Apply:**

   With: Ground equipment only. Do not apply by air.

   Rate: Assure 400 mL/ac + Muster 8 g/ac plus 5 - 10 L of Sure-Mix per 1,000 litres spray solution.

   Water volume: Minimum of 40 L/ac.

   Pressure: 210 - 275 kPa.

   Nozzles: Use flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh screens or larger.

Sprayer clean-up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Muster when cleaning equipment.

1. Drain tank. Flush tank, boom and hoses with clean water for a minimum of ten minutes. Visually inspect the tank to ensure removal of all visible residues of Muster. If necessary, repeat step 1.
2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum of 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes with agitation. Flush the hoses, booms and nozzles with the cleaning solution again and drain the tank.
3. Remove nozzles and screens. Clean separately in bucket containing cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** Best results on wild oats if application is made prior to tillering. When very high weed seedling population occurs, larger seedlings may interfere with coverage of smaller seedlings, and control may be reduced. Regrowth may also occur if crop competitiveness is reduced by thin stands and/or reduced vigour. Do not apply Muster Gold to plants stressed by severe conditions such as drought, low fertility, saline soils, water-logged soils, disease or insect damage as crop injury may result.

9. **How it Works:** Assure II is a systemic herbicide that is rapidly absorbed and readily translocated from the treated foliage to the root system and growing points of the plant. Muster is absorbed by the foliage and roots. Inhibits cell elongation.

10. **Expected Results:** Broadleaf weed growth stops almost immediately. Grassy weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the younger plant tissues is followed by a progressive collapse of the remaining foliage. These results will generally be observed in 1 - 3 weeks depending on the grass species treated and the environmental conditions. **Poor results may be expected** with improper mixing, timing or coverage, or when weeds are under stress.

11. **Effects of Rainfall:** If rainfall occurs soon after application, control may be reduced. Some 4 - 6 hours of dry weather is needed to allow Muster Gold to be absorbed by weed foliage. Environmental conditions that slow the drying of Muster Gold on the foliage, such as high relative humidity, cool air temperature or cloud cover, may increase the time required.

12. **Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral to acidic conditions.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields or harvest for forage or hay. Do not harvest within 64 days of treatment.

    Minimum crop rotation guidelines: Minimum interval is from the last application of Muster Gold to the date of planting the rotational crop.

    Interval prior to planting (months after application):
    10 months – spring wheat, durum wheat, barley, flax, oats.
    22 months – alfalfa, canary grass, canola, drybeans, fababeans, fescue, lentils, peas, red clover, tame mustard.
    All other crops, field bioassay at 22 months.
    *Wherever Muster Gold is used on land previously treated with Ally herbicide, read the rotational guidelines on both labels, and follow the label with the longest interval stated for such a situation.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD$_{50}$ (rats) > 5,000 mg/kg. May irritate eyes, nose, throat and skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place, but not below 0°C.

Muster Gold (cont'd)

17. **Resistance Management:** Some of the naturally occurring biotypes of certain weeds listed on this label may not be controlled. To delay selection of resistant populations, rotate the use of Group 1 and Group 2 products with other products effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Muster Gold II *(quizalofop-ethyl + ethametsulfuron-methyl)*

Group 1,2

Manufacturer: DuPont Canada Inc

1. **Formulations:**
   Muster (Dry flowable): 75%; 320 grams, (4 x 80 grams) water soluble pouches.
   Assure II (Emulsifiable Concentrate): 96 g/L; 1 x 8 L + 1 jug Sure-Mix (adjuvant).
2. **Registered Mixes:** None.
3. **Crops:** Canola (spring).
4. **Weeds Controlled:**
   - barnyard grass
   - flixweed (spring seedlings)
   - green foxtail
   - green smartweed
   - hemp-nettle
   - stinkweed
   - volunteer barley
   - volunteer wheat
   - wild mustard
   - wild oats
5. **Weeds Suppressed:** Quackgrass at 200 mL/ac rate.
6. **When Used:** Apply post-emergence to crop from 2 leaf to beginning of bolting, when annual grassy weeds are in the 2 leaf to early tillering stage and when quackgrass is in the 2 - 6 leaf stage. Best results on wild oats if application is made prior to tillering. For optimum control, apply Muster Gold II at the cotyledon to 6 leaf stage of the target broadleaf weeds. For stinkweed, apply Muster Gold II when actively growing: 1 - 4 leaf stage.
7. **How to Apply:**

   With: Ground equipment only. Do not apply by air.

   Rate: Assure II 200 mL/ac + Muster 8 g/ac plus 5 L of Sure-Mix per 1000 litres spray solution.

   Water volume: Minimum of 40 L/ac.

   Pressure: 210 - 275 kPa.

   Nozzles: Use flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh screens or larger.

   Mixing instructions:
   1. Fill tank 1/2 - 3/4 amount of required water with agitator running.
   2. Add the required amount of Muster Toss-N-Go and ensure it is completely in suspension.
   3. Add required amount of Assure II and continue agitating.
   4. Add remainder of water, then add the Sure-Mix (adjuvant). Continuous agitation is required.

Sprayer clean-up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Muster when cleaning equipment.

1. Drain tank and flush tank, boom and hoses with clean water for a minimum of 10 minutes. Visually inspect the tank to assure removal of all visible residues of Muster. If necessary, repeat step 1.
2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum of 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes with agitation. Again, flush the hoses, booms and nozzles with the cleaning solution and drain the tank.
3. Remove nozzles and screens, and clean separately in bucket containing cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** Best results on wild oats if application is made prior to tillering. For optimum control, apply Muster Gold II at the cotyledon to 6 leaf stage of the target broadleaf weeds. For stinkweed, apply Muster Gold II when actively growing: 1 - 4 leaf stage. When very high weed seedling population occurs, larger seedlings may interfere with coverage of smaller seedlings, and control may be reduced. Regrowth may also occur if crop competitiveness is reduced by thin stands and/or reduced vigour. Do not apply Muster Gold II to plants stressed by severe conditions such as drought, low fertility, saline soils, waterlogged soils, disease or insect damage as crop injury may result.
9. **How it Works:** Assure II is a systemic herbicide that is rapidly absorbed and readily translocated from the treated foliage to the root system and growing points of the plant. Muster is absorbed by the foliage and roots. Inhibits cell elongation.
10. **Expected Results:** Broadleaf weed growth stops almost immediately. Grassy weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the younger plant tissues is followed by a progressive collapse of the remaining foliage. These results will generally be observed in 1 - 3 weeks, depending on the grass species treated and the environmental conditions. **Poor results may be expected if** there is improper mixing, timing or coverage, or when weeds are under stress.
11. **Effects of Rainfall:** If rainfall occurs soon after application, control may be reduced. Four to six hours of dry weather are needed to allow Muster Gold II to be absorbed by weed foliage. Environmental conditions that slow the drying of Muster Gold II on the foliage, such as high relative humidity, cool air temperature or cloud cover, may increase the time required.
12. **Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral to acidic conditions.
13. **Grazing and Cropping Restrictions:** Do not graze treated fields or harvest for forage or hay. Do not harvest within 64 days of treatment.

    Minimum crop rotation guidelines: Minimum interval is that from the last application of Muster Gold II to the date of planting the rotational crop.

    Interval prior to planting (months after application):
    10 months - spring wheat, durum wheat, barley, flax, oats.
    22 months - alfalfa, canary grass, canola, drybeans, fababeans, fescue, lentils, peas, red clover, tame mustard.
    All other crops, field bioassay at 22 months.
    *Wherever Muster is used on land previously treated with Ally herbicide, read the rotational guidelines on both labels and follow the label with the longest interval stated for your situation.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) > 5000 mg/kg. May irritate eyes, nose, throat and skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place, but not below 5°C.

Muster Gold II (cont'd)

17. **Resistance Management:** Some of the naturally occurring biotypes of certain weeds listed on this label may not be controlled. To delay selection of resistant populations, rotate the use of Group 1 and Group 2 products with other products effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Nortron *(ethofumesate)*

Group 16

Manufacturer **Aventis Crop Science**

1. **Formulations:** Suspension Concentrate: 480 g/L; 10 L jug.
2. **Registered Mixes:** Ro-Neet, TCA, Pyramin.
3. **Crops:** Sugar beets.
4. **Weeds Controlled:**
   - barnyard grass
   - foxtail
   - kochia
   - lady's-thumb
   - lamb's-quarters
   - pigweed
   - purslane
   - redroot
   - shepherd's-purse
   - volunteer barley and oats
   - volunteer wheat
   - wild oats
5. **Weeds Suppressed:** Wild buckwheat, Russian thistle, black nightshade.
6. **When Used:** Nortron may be fall-layered, spring-applied before planting and pre-emergence.
7. **How to Apply:**

   With: Ground equipment.

   Rate: Dependent upon soil type – 1.3 L - 3.3 L per acre broadcast; 0.4 - 1.13 L per acre applied on an 18 cm band/ 55 cm row.

   Norton + Pyramin tank mix: For medium textured soils (silt and clay loams with <3% organic matter) 1.48 L/ac Nortron + 2.12 L/ac Pyramin broadcast basis; **or** 0.48 L/ac Nortron + 0.7 L/ac Pyramin applied on an 18 cm band/55 cm row. **Note:** This tank mix is not recommended on light textured soils (sands, loamy sands and sandy loams).

   Water volume: 44 - 222 litres per acre.

   Pressure: Apply Nortron to the soil using standard low pressure (150 - 350 kPa) spray equipment.

   Nozzles: Do not use smaller than 50 mesh strainer nor less than an 8002E nozzle orifice.
8. **Application Tips:** Apply Nortron before or at planting time and incorporate into the soil to a depth of 2.5 - 5.0 cm. Deeper incorporation may reduce effectiveness. Nortron may be applied pre-emergence at the time of planting or shortly after, but prior to weed emergence.

   Incorporation equipment: Hooded-power or ground-driven rotary tillers, rolling cultivators and harrows are most effective for incorporating Nortron into the soil. Do not apply Nortron through soil injector shanks. Large clods can reduce the effectiveness of Nortron. All existing vegetative growth should be thoroughly worked into the soil before treatment. Do not allow spray mixture to stand in tank overnight.
9. **How it Works:** Uptake of ethofumesate occurs primarily via the emerging shoot as it passes upwards through treated soil; however, for certain broadleaf species, root uptake is more important. Ethofumesate is non-volatile, and in all cases, uptake occurs from aqueous solution.
10. **Expected Results:** Nortron, applied pre-plant incorporated with proper activation, will normally not permit weed emergence. If emergence should occur, uptake has occurred; seedling will show loss of vigor and eventual death.

M121

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11. **Effects of Rainfall:** Normally 1.5 cm of rainfall is sufficient to activate Nortron. In areas where moisture can be marginal, incorporation is recommended.

12. **Movement in Soil:** Under normal conditions, ethofumesate is only slowly leached from the soil surface, and most of the material remains concentrated in the upper 15 cm.

13. **Grazing and Cropping Restrictions:** Where Nortron is used in combination with TCA, do not use treated sugar beet tops for feed or forage. Do not rotate with any crops other than sugar beets for 12 months after application. Thorough tillage, including moldboard plowing, should precede the planting of crops other than sugar beets. Do not use Nortron on muck or peat soils. If crop is lost due to climatic or soil conditions following application of Nortron, do not plant crops other than sugar beets in Nortron-treated land during the same season. If fields are replanted to sugar beets, reseed into treated band. Do not retreat field with Nortron. To reduce injury to rotational crops following a dry sugar beet season, Nortron should be applied only in a band, and field should be moldboard plowed after harvest. Wheat and barley may be injured if planted following a dry sugar beet year.

14. **Toxicity:**

E.C. formulation	
Acute oral LD_{50} (rat):	2,100 mg/kg.
Acute dermal LD_{50} (rat):	> 4,100 mg/kg.
Technical material	
Acute oral LD_{50} (rat):	6,400 mg/kg.
Acute oral LD_{50} (bobwhite quail):	> 8,343 mg/kg.
Acute dermal LD_{50} (rat):	> 1,440 mg/kg.
Dietary LD_{50} (mallard duck):	> 10,000 mg/kg.
Toxic to fish	

Danger: Eye irritant. Causes eye or skin irritation. Do not get in eyes, on skin or on clothing. Harmful if swallowed. **Avoid inhalation of fumes.**

15. **Precautions, First Aid: If in eyes or on skin**, use standard first aid measures (see page xxiii). **If swallowed**, call a physician or poison control center. Drink one or two glasses of water and induce vomiting by touching the back of the throat with a finger. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If skin contact**, wash with soap and water. **If in eyes**, immediately flush with water for 15 minutes.

Environmental Hazards: Keep out of lakes, ponds or streams. Do not contaminate water by cleaning of equipment or disposal of wastes.

16. **Storage:** Do not use or store near heat or open flames. Store **Nortron** in a cool place, above 0°C.

11. **Effects of Rainfall:** Normally 1.5 cm of rainfall is sufficient to activate Nortron. In areas where moisture can be marginal, incorporation is recommended.

12. **Movement in Soil:** Under normal conditions, ethofumesate is only slowly leached from the soil surface, and most of the material remains concentrated in the upper 15 cm.

13. **Grazing and Cropping Restrictions:** Where Nortron is used in combination with TCA, do not use treated sugar beet tops for feed or forage. Do not rotate with any crops other than sugar beets for 12 months after application. Thorough tillage, including moldboard plowing, should precede the planting of crops other than sugar beets. Do not use Nortron on muck or peat soils. If crop is lost due to climatic or soil conditions following application of Nortron, do not plant crops other than sugar beets in Nortron-treated land during the same season. If fields are replanted to sugar beets, reseed into treated band. Do not retreat field with Nortron. To reduce injury to rotational crops following a dry sugar beet season, Nortron should be applied only in a band, and field should be moldboard plowed after harvest. Wheat and barley may be injured if planted following a dry sugar beet year.

14. **Toxicity:**

S.C. formulation

Acute oral LD_{50} (rat):	2,100 mg/kg.
Acute dermal LD_{50} (rat):	> 4,100 mg/kg.

Technical material

Acute oral LD_{50} (rat):	6,400 mg/kg.
Acute oral LD_{50} (bobwhite quail):	> 8,343 mg/kg.
Acute dermal LD_{50} (rat):	> 1,440 mg/kg.
Dietary LD_{50} (mallard duck):	> 10,000 mg/kg.
Toxic to fish	

Danger: Eye irritant. Causes eye or skin irritation. Do not get in eyes, on skin or on clothing. Harmful if swallowed. **Avoid inhalation of fumes.**

15. **Precautions, First Aid: If in eyes or on skin**, use standard first aid measures (see page xxiii). **If swallowed**, call a physician or poison control center. Drink one or two glasses of water and induce vomiting by touching the back of the throat with a finger. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If skin contact**, wash with soap and water. **If in eyes**, immediately flush with water for 15 minutes.

    Environmental Hazards: Keep out of lakes, ponds or streams. Do not contaminate water by cleaning of equipment or disposal of wastes.

16. **Storage:** Do not use or store near heat or open flames. Store **Nortron** in a cool place, above 0 C.

Odyssey *(imazamox + imazethapyr)*

Group 2

Manufacturer: **Cyanamid Crop Protection**

1. **Formulations:** Water dispersible granular; 70% (imazamox – 35% + imazethapyr – 35%); 4 - 173 g water soluble bags per case.
2. **Registered Mixes:** Lontrel (SMART Canola).

   Surfactants: Merge (included in case) at 0.5% of the water volume.

   Mixing instructions: Use a 50 mesh (or coarser) filter screen. Fill sprayer tank with 3/4 the required amount of clean water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Add the required amount of Odyssey soluble bag(s) directly into the sprayer tank opening. Agitate for at least 10 minutes to dissolve herbicide, if mixing with Lontrel, add Lontrel to the tank and agitate, mixing thoroughly. Add the required amount of Merge. Complete filling the tank to the desired level with water.
3. **Crops:** SMART Canola, field peas.
4. **Weeds Controlled:**

12 g/ac

redroot pigweed
volunteer tame mustard
wild mustard

17 g/ac

barnyard grass
chickweed
cleavers
flixweed
green foxtail
green smartweed
hemp-nettle*
kochia
lamb's-quarters**
Persian darnel
redroot pigweed
Russian thistle
shepherd's-purse
stinkweed
stork's-bill
volunteer barley
volunteer wheat
volunteer canola (except SMART canola)
volunteer tame oats
volunteer tame mustard
wild buckwheat*
wild mustard
wild oats

* Suppression in field peas.
** Suppression in field peas and SMART canola.

5. **Weeds Suppressed:** Lamb's-quarters.
6. **When Used:**

   All Soil Zones: Apply between the 2 - 6 true leaf of SMART canola and the 1 - 6 node of field peas and after the weeds have emerged.

   Broadleaf weeds: Apply from the cotyledon to 4 leaf stage.

   Grasses: Apply from the 1 - 4 true leaf stage up to early tillering.
7. **How to Apply:**

   With: Ground equipment only.

   Rate: 12 or 17 g/ac.

   Surfactant: Merge at 0.5% v/v (e.g., 5 L/1000 L spray solution).

   Water volume: 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: 50 mesh screens (or coarser). Flat fan recommended tilted 45° forward for better penetration.

   Incorporation: Not applicable.

Odyssey *(imazamox + imazethapyr)*

Group 2

Manufacturer: **Cyanamid Crop Protection**

1. **Formulations:** Water dispersible granular; 70% (imazamox – 35% + imazethapyr – 35%); 4 - 173 g water soluble bags per case.
2. **Registered Mixes:** Lontrel (SMART Canola).

   Surfactants: Merge (included in case) at 0.5% of the water volume.

   Mixing instructions: Use a 50 mesh (or coarser) filter screen. Fill sprayer tank with 3/4 the required amount of clean water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Add the required amount of Odyssey soluble bag(s) directly into the sprayer tank opening. Agitate for at least 10 minutes to dissolve herbicide, if mixing with Lontrel, add Lontrel to the tank and agitate, mixing thoroughly. Add the required amount of Merge. Complete filling the tank to the desired level with water.
3. **Crops:** SMART Canola, field peas.
4. **Weeds Controlled:**

   12 g/ac

   - redroot pigweed
   - volunteer tame mustard
   - wild mustard

   17 g/ac

   - barnyard grass
   - chickweed
   - cleavers
   - flixweed
   - green foxtail
   - green smartweed
   - hemp-nettle*
   - kochia
   - lamb's-quarters**
   - Persian darnel
   - redroot pigweed
   - Russian thistle
   - shepherd's-purse
   - stinkweed
   - stork's-bill
   - volunteer barley
   - volunteer wheat
   - volunteer canola (except SMART canola)
   - volunteer tame oats
   - volunteer tame mustard
   - wild buckwheat*
   - wild mustard
   - wild oats

   * Suppression in field peas.
   ** Suppression in field peas and SMART canola.
5. **Weeds Suppressed:** Lamb's-quarters.
6. **When Used:**

   All Soil Zones: Apply between the 2 - 6 true leaf of SMART canola and the 1 - 6 node of field peas and after the weeds have emerged.

   Broadleaf weeds: Apply from the cotyledon to 4 leaf stage.

   Grasses: Apply from the 1 - 4 true leaf stage up to early tillering.
7. **How to Apply:**

   With: Ground equipment only.

   Rate: 12 or 17 g/ac.

   Surfactant: Merge at 0.5% v/v (e.g., 5 L/1000 L spray solution).

   Water volume: 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: 50 mesh screens (or coarser). Flat fan recommended tilted 45° forward for better penetration.

   Incorporation: Not applicable.

8. **Application Tips:** Water soluble bags will dissolve better when kept intact, do not split bags. If agitation is stopped for more that 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray if freezing temperatures are forecast. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield.

9. **How it Works:** Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Residual activity of small seeded, shallow germinating flushing weeds (not wild oats) expected until crop flowering. Moist conditions result in beter residual control.

10. **Expected Results:** Susceptible weeds stop growing within 24-48 hours. Yellow striping and purplish or reddish discoloration of the leaves may occur. Leaves begin to die in 3-10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1-3 weeks.

11. **Effects of Rainfall:** Insufficient data, recommend 6 hours between application and rainfall.

12. **Movement in Soil:** Not leached appreciably.

13: **Grazing and Cropping Restrictions:** Do not graze treated crops or cut for hay; there are not sufficient data to support such use. Field peas treated with Odyssey may be fed to livestock 30 days after application. Only apply Odyssey once per year.

    Minimum interval to harvest: 60 days.

    Succeeding crops: Spring wheat, durum wheat, field peas and SMART canola can be grown safely the year following an application. There are insufficient data for other follow crops. Conduct a field bioassay the year before growing any crops other than those listed above. In case of crop failure, replant only to SMART canola or field peas.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) 5000 mg/kg. Non-toxic to fish, birds and bees.

15. **Precaution, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store at temperatures above 5°C. Keep unused water soluble bags in resealed, original container. Keep packages dry at all time.

Pardner *(bromoxynil)*

Group 6

Manufacturer: **Aventis Crop Science**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; 280 g/L, 8 L jug.

2. **Registered Mixes:** Low rate Atrazine (corn, sweet, field); Avenge or Avenge + MCPA ester (barley, Avenge wheat varieties); Banvel (field corn), Hoe-Grass 284 [barley (**not** Betzes or Klages), seedling grasses (brome, creeping red fescue, crested and intermediate wheatgrass, Russian wild ryegrass), spring wheat]. MCPA (amine, ester, K-Salt) (barley, oats, wheat, canary seed, seedling grasses, fall rye); Roundup (chemical fallow); 2,4-D (amine, ester) (barley, wheat); MCPA + NaTA (barley, oats).

   Mixing restrictions: Add Atrazine; MCPA; or 2,4-D to water first, then Pardner.

Pardner (cont'd)

3. Crops:

Underseeding: Legumes not recommended.

alfalfa (seedling)
barley (9.0)
canary seed (9.0)
corn, field (9.0)
corn, sweet (8.3)
garlic
oats (8.8)
rye, fall
triticale (9.0)
wheat [durum, spring, winter (8.9)]

Seedling grasses for seed production
bromegrass (8.7)
fescue [creeping red (8.6), meadow (8.3)]
orchard grass (8.6)
reed canary grass (8.3)
timothy (8.8)
wheatgrass [crested (8.3), intermediate, slender, tall]
wild rye, Russian (8.9)

Established alfalfa (for seed production only).

4. Weeds Controlled:

American nightshade
annual smartweed (8.1)
black nightshade
bluebur
cocklebur
common groundsel (9.0)
common ragweed
cow cockle (6.9)
knawel (7.7)
kochia
lady's-thumb
lamb's-quarters (8.4)
night-flowering catchfly (8.0)
redroot pigweed (7.9)*
Russian thistle (8.4)
stinkweed (8.4)
tartary buckwheat (8.4)
volunteer buckwheat (8.4)
wild buckwheat (8.4)
wild mustard (8.5)

* Triazine resistant.

5. Weeds Suppressed: None.

6. When Used:

Weeds: Seedling to 4 leaf stage, except Russian thistle to 5 cm tall. Generally best results if weeds are in seedling stage. To control scentless chamomile and knawel, spray before 3 leaf stage.

Crops: Barley, canary seed, corn (field, sweet), oats, triticale, wheat: 2 leaf to early flag leaf. 2,4-D Mix on wheat or barley after 4 leaf. Winter wheat, fall rye: first growth to early flag leaf. Corn: Pardner alone or Atrazine Mix: until crop is 25 cm tall. Canary seed: 3 - 5 leaf. Seedling grasses, grown for seed production: 2 - 4 leaf. Seedling alfalfa: 2 - 6 trifoliate stage.

Established alfalfa: Treat at any stage of growth; maximum 2 applications per year.

7. How to Apply:

With: Ground equipment or aircraft (wheat and barley only). Spra-coupes not recommended.

Rate:

Crop	Pardner
Barley, corn (field, sweet), oats, triticale, wheat	405 - 485 mL/ac
Canary seed	405 mL/ac
Rye (fall), wheat (winter)	405 - 485 mL/ac
Seedling grasses (grown for seed production only)	405 - 485 mL/ac
Seedling alfalfa	405 mL/ac
Established alfalfa (for seed production only)	405 - 485 mL/ac

Water volume: 40 L/ac. Corn: 60 L/ac; 8 L/ac (air).

Pressure: 275 kPa.

Nozzles: Flat fan nozzles recommended or Hollow cone (air only).

8. Application Tips: Avoid spraying crops during adverse growing conditions, especially drought, high temperatures (over 29°C) or in high humidity. Observe all Glean precautions (with Glean mix), including soil pH limits and crop rotations.

9. How it Works: A contact herbicide, so good coverage is essential. Inhibits respiration and photosynthesis causing death.

10. Expected Results:

Weeds: Turn brown and die within 3 - 5 days – more rapid under good growing conditions and when applied to seedling weeds. **Poor results can be expected if** weeds past 4 leaf stage, poor spray coverage or lower than recommended rate used. Injury to corn may occur if under stress.

11. **Effects of Rainfall:** None.
12. **Movement in Soil:** None.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest for green feed until 30 days after treatment.

    Succeeding crops: No restrictions.
14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (440). Very toxic to fish. Intake of a large dose may cause convulsions, sudden collapse and coma. Can be absorbed through the skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of acute poisoning: Stomach cramps, diarrhea, sore throat may appear.
16. **Storage:** Do not store the water soluble bags below freezing.

Patoran *(metobromuron)*

Group 7

Manufacturer: **Novartis Crop Protection Canada Inc.**

1. **Formulations:** Liquid Suspension; Patoran FL; 400 g/L; 10 L jug.
2. **Registered Mixes:** Dual 960 EC (potatoes, soybeans).
3. **Crops:** Beans [dry (kidney, white, pinto), adzuki, lima, snap (yellow and green, except Slim Green)], potatoes, soybeans, sweet white lupins.
4. **Weeds Controlled:**

    annual bluegrass
    black nightshade
    chickweed*
    corn spurry
    crabgrass
    cudweed
    grass barnyard*
    green foxtail*
    green smartweed
    groundsel*
    lady's-thumb
    lamb's-quarters
    mustards
    pigweeds
    purslane
    ragweed
    shepherd's-purse
    stinkgrass
    stinkweed*
    witchgrass

    * Higher rate is required for control.
5. **Weeds Suppressed:** Annual grasses.
6. **When Used:** Post-plant but pre-emergent to crop and weeds. Patoran can be applied either as:
    1. A pre-emergent spray in tank mix combination with Dual 960 EC (potatoes, soybeans).
    2. A pre-emergent spray preceded by a pre-plant incorporated spray of Dual 960 EC (beans, potatoes, soybeans).
7. **How to Apply:**

    With: Ground equipment.

    Rate: Range of rates is based on susceptible and moderately susceptible weeds.

Crop	Sandy loam soils (L/ac)	Clay, muck soils (L/ac)
Beans	1.0 - 1.6	1.2 - 1.7
Potatoes	1.0 - 2.2	1.0 - 2.8
Soybeans	1.0 - 1.7	1.2 - 2.2

Do not use on the bean variety Slim Green and Provider. Use 1.0 L/ac for the bean varieties: Yellow-eye, cranberry, white kidney, light-red kidney, and dark-red kidney. Do not use on potato variety Superior.

Pardner (cont'd)

3. Crops:

Underseeding: Legumes not recommended.

alfalfa (seedling)
barley (9.0)
canary seed (9.0)
corn, field (9.0)
corn, sweet (8.3)
garlic

oats (8.8)
rye, fall
triticale (9.0)
wheat [durum, spring, winter (8.9)]

Seedling grasses for seed production
bromegrass (8.7)
fescue [creeping red (8.6), meadow (8.3)]
orchard grass (8.6)

reed canary grass (8.3)
timothy (8.8)
wheatgrass [crested (8.3), intermediate, slender, tall]
wild rye, Russian (8.9)

Established alfalfa (for seed production only).

4. Weeds Controlled:

American nightshade
annual smartweed (8.1)
black nightshade
bluebur
cocklebur

common groundsel (9.0)
common ragweed
cow cockle (6.9)
knawel (7.7)
kochia

lady's-thumb
lamb's-quarters (8.4)
night-flowering catchfly (8.0)
redroot pigweed (7.9)*
Russian thistle (8.4)

stinkweed (8.4)
tartary buckwheat (8.4)
volunteer buckwheat (8.4)
wild buckwheat (8.4)
wild mustard (8.5)

* Triazine resistant.

5. Weeds Suppressed: None.

6. When Used:

Weeds: Seedling to 4 leaf stage, except Russian thistle to 5 cm tall. Generally best results if weeds are in seedling stage. To control scentless chamomile and knawel, spray before 3 leaf stage.

Crops: Barley, canary seed, corn (field, sweet), oats, triticale, wheat: 2 leaf to early flag leaf. 2,4-D Mix on wheat or barley after 4 leaf. Winter wheat, fall rye: first growth to early flag leaf. Corn: Pardner alone or Atrazine Mix: until crop is 25 cm tall. Canary seed: 3 - 5 leaf. Seedling grasses, grown for seed production: 2 - 4 leaf. Seedling alfalfa: 2 - 6 trifoliate stage.

Established alfalfa: Treat at any stage of growth; maximum 2 applications per year.

7. How to Apply:

With: Ground equipment or aircraft (wheat and barley only). Spra-coupes not recommended.

Rate:

Crop	Pardner
Barley, corn (field, sweet), oats, triticale, wheat	405 - 485 mL/ac
Canary seed	405 mL/ac
Rye (fall), wheat (winter)	405 - 485 mL/ac
Seedling grasses (grown for seed production only)	405 - 485 mL/ac
Seedling alfalfa	405 mL/ac
Established alfalfa (for seed production only)	405 - 485 mL/ac

Water volume: 40 L/ac. Corn: 60 L/ac; 8 L/ac (air).

Pressure: 275 kPa.

Nozzles: Flat fan nozzles recommended or Hollow cone (air only).

8. Application Tips:

Avoid spraying crops during adverse growing conditions, especially drought, high temperatures (over 29 C) or in high humidity. Observe all Glean precautions (with Glean mix), including soil pH limits and crop rotations.

9. How it Works:

A contact herbicide, so good coverage is essential. Inhibits respiration and photosynthesis causing death.

10. Expected Results:

Weeds: Turn brown and die within 3 - 5 days – more rapid under good growing conditions and when applied to seedling weeds. **Poor results can be expected if** weeds past 4 leaf stage, poor spray coverage or lower than recommended rate used. Injury to corn may occur if under stress.

11. **Effects of Rainfall:** None.
12. **Movement in Soil:** None.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest for green feed until 30 days after treatment.

    Succeeding crops: No restrictions.
14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (440). Very toxic to fish. Intake of a large dose may cause convulsions, sudden collapse and coma. Can be absorbed through the skin.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of acute poisoning: Stomach cramps, diarrhea, sore throat may appear
16. **Storage:** Do not store the water soluble bags below freezing.

Patoran *(metobromuron)*

Group 7

Manufacturer: Novartis Crop Protection Canada Inc.

1. **Formulations:** Liquid Suspension: Patoran FL: 400 g/L: 10 L jug.
2. **Registered Mixes:** Dual 960 EC (potatoes, soybeans).
3. **Crops:** Beans [dry (kidney, white, pinto), adzuki, lima, snap (yellow and green, except Slim Green)], potatoes, soybeans, sweet white lupins.
4. **Weeds Controlled:**

annual bluegrass
black nightshade
chickweed*
corn spurry
crabgrass
cudweed
grass barnyard*
green foxtail*
green smartweed
groundsel*
lady's-thumb
lamb's-quarters
mustards
pigweeds
purslane
ragweed
shepherd's-purse
stinkgrass
stinkweed*
witchgrass

*Higher rate is required for control.

5. **Weeds Suppressed:** Annual grasses.
6. **When Used:** Post-plant but pre-emergent to crop and weeds. Patoran can be applied either as:
    1. A pre-emergent spray in tank mix combination with Dual 960 EC (potatoes, soybeans).
    2. A pre-emergent spray preceded by a pre-plant incorporated spray of Dual 960 EC (beans, potatoes, soybeans).
7. **How to Apply:**

    With: Ground equipment.

    Rate: Range of rates is based on susceptible and moderately susceptible weeds.

Crop	Sandy loam soils (L/ac)	Clay, muck soils (L/ac)
Beans	1.0 - 1.6	1.2 - 1.7
Potatoes	1.0 - 2.2	1.0 - 2.8
Soybeans	1.0 - 1.7	1.2 - 2.2

Do not use on the bean variety Slim Green and Provider. Use 1.0 L/ac for the bean varieties: Yellow eye, cranberry, white kidney, light-red kidney, and dark-red kidney. Do not use on potato variety Superior.

Patoran (cont'd)

Water volume: 70 - 140 L/ac.

Pressure: 200 - 300 kPa.

Nozzles: Nozzle screens should be 50 mesh or larger.

Incorporation: Do not soil-incorporate Patoran.

8. **Application Tips:** Do not let spray tank mixture stand without agitation before use. Keep by-pass line on or near the bottom of spray tank to prevent foaming. Do not apply Patoran to sandy soils of less than 2% organic matter. Do not apply to crops that have emerged. Heavy rainfall after application may cause damage to beans.
9. **How it Works:** Absorbed through the roots, inhibits photosynthesis.
10. **Expected Results:** Weed emergence will be inhibited or absent. Under dry conditions, some weed emergence and early die-back can occur.
11. **Effects of Rainfall:** Enhance efficacy. Shallow planted crops may be injured if heavy rain follows application.
12. **Movement in Soil:** Patoran can be leached in light soils.
13. **Grazing and Cropping Restrictions:** Do not apply 110 days to harvest.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (2,600). Non-toxic to fish and birds. Slightly toxic to bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry, well-ventilated area with suitable containment to prevent entry to the environment in the event of a spill.

Pea Pack *(metribuzin + MCPA-sodium (Na) salt)*

Group 4,5

Manufacturer: **Bayer Inc.**

CAUTION POISON

1. **Formulations:**

   Sencor 75DF: Dispersible granule; 750 g/kg; 1 x 3 kg container.

   MCPA-sodium (Na) salt: Solution; 300 g/L; 1 x 7.6 L container.
2. **Registered Mixes:** None.
3. **Crops:** Peas (field, processing) only. **Do not** use on lentils or chickpeas. **Do not** use on soils with less than 3% organic matter.
4. **Weeds Controlled:**

   green smartweed
   lady's-thumb
   lamb's-quarters
   redroot pigweed
   stinkweed
   wild mustard
   volunteer canola (including all herbicide tolerant canola's except triazine-tolerant cultivars)
5. **Weeds Suppressed:** None.
6. **When Used:**

   Crop: Do not use if soil has less than 3% organic matter. Apply post-emergent before vines are 15 cm long or before the 6 node stage. Crop tolerance is not affected by early application.

   Weeds: Apply post-emergent when weeds are small, at the cotyledon, 2 leaf stage (less than 5 cm in height or diameter).

7. **How to Apply:**

   Rate: 77 g/ac Sencor DF and 190 mL/ac MCPA-sodium (Na) salt per acre.

   Water volume: 70 L/ac.

   Pressure: 200 - 275 kPa.

   Nozzles: Flat fan nozzles with an opening no smaller than 8002 or TK2 with 50 mesh screen. Angle nozzles 45° forward.

   Sprayer clean-up: Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed.

   1. Drain any remaining solution from the spray tank.
   2. Rinse the spray tank.
   3. Refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for 5 minutes and spray out.
   4. Repeat this procedure twice.
   5. Fill the spray tank with clean water, recycle for 5 minutes, and spray out.
   6. Clean pump and nozzle screens thoroughly.
   7. Wash away and spray mixture from the outside of the spray tank, nozzles or spray rig.

8. **Application Tips:** Allow 4 - 5 days between applications of Pea Pack and the application of a post-emergent wild oat herbicide. Allow 4 - 5 days after frost for crop to recover before applying Pea Pack. Weed control may be reduced if Pea Pack is applied later than the 6th node of crop.

9. **How it Works:** Sencor is a systemic herbicide that kills weeds by stopping photosynthesis. MCPA sodium salt is a systemic herbicide that disrupts cell division. MCPA sodium salt is absorbed through leaves and roots and is translocated to actively growing areas in the plant.

10. **Expected Results:**

    Broadleaf weeds: For weeds susceptible to Sencor 75DF, initial yellowing will occur within 7 - 10 days; weeds turn brown and die within 14 - 16 days. For weeds susceptible to MCPA-Na, twisting begins between 2 - 20 days after application, followed by the plant turning brown and dying.

    Crop: Yellowing may occur if high temperatures take place within 48 hours of application. Cold, cloudy weather or frost within 3 days of application may cause reduced weed control and some yellowing of crop. If frost occurs, allow 4 - 5 days for crop to recover prior to applying Pea Pack. Applications made under conditions of high humidity may cause pea vines to droop, but the crop will recover quickly.

11. **Effects of Rainfall:** Rainfall within 6 hours after application may reduce weed control of Pea Pack, and within 2 hours may reduce weed control of MCPA-Na.

12. **Movement in Soil:** For Sencor 75DF, little leaching occurs in soil with a high organic matter. MCPA-Na is readily leached from soil. Longer residual in dry soil.

13. **Grazing and Cropping Restrictions:**

    Grazing: Do not graze peas within 70 days of application.

    Pre-harvest: Do not harvest peas within 70 days of application.

    Re-cropping: No re-cropping restrictions in the year following application.

14. **Toxicity:**

    Sencor 75DF: Low acute mammalian toxicity. Acute oral LD_{50} (rats) mg/kg) = (1,100 - 2,300). Slightly toxic to fish and birds.

    MCPA-Na: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700 - 800). Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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Pea Pack (cont'd)

16. **Storage:**

    Sencor 75DF: No damage by freezing, but avoid large temperature fluctuations. Store in a cool, dry place.

    MCPA-Na: If frozen, warm to 5°C and mix well before using.

Poast Ultra *(sethoxydim)*

Group 1

Manufacturer: **BASF**

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; 450 g/L; 1 x 7.7 L Poast Ultra + 2 x 8.1 L Merge.
2. **Registered Mixes:**

   Canola: Lontrel, Muster, Pursuit (SMART canola only), Liberty (Liberty Link canola only).

   Flax: Buctril M, MCPA Ester, Lontrel, Lontrel + MCPA Ester.

   Peas (dry): Pursuit.

   Mixing instructions:

   Poast Ultra + Pursuit: A reduced rate of Pursuit (42.5 mL/acre) can be used when Poast Ultra and Pursuit are tank mixed. Do not use a rate of Poast Ultra less than 190 mL/acre in tank mixes with Pursuit.

   Poast Ultra + Liberty + Merge: A reduced rate of Poast Ultra (95 mL/ac) can be tank mixed with Liberty to control volunteer barley. Merge should be added at 200 mL/ac using 45 mL/ac water volume. Refer to Liberty label for use instructions.

Usual mix order	Mix order exceptions
1. Poast Ultra	1. Muster
2. Broadleaf herbicide	2. Poast Ultra
3. Merge	3. Merge

3. **Crops:** Alfalfa (seedling and established), beans [adzuki, dry common, faba, lima, mung, snap, common (9.0)], buckwheat, caraway, coriander, cucumbers* (8.9), dill, flax (including low linolenic) (9.0), forage legumes for seed (seedling and established: alfalfa, alsike clover, cicer milkvetch, sainfoin, sweet clover), garlic, lentils (9.0), creeping red fescue (seed production only), linola, onions [dry bulb (8.8)], peas [dry, fresh, processing (9.0)], potatoes (9.0), rapeseed [including canola (9.0)], soybeans (9.0), sugar beets (9.0), tomatoes, broccoli, cabbage, cauliflower, safflower, mint crops (spearmint, peppermint), cranberry, chickpeas.
4. **Weeds Controlled:**

   barnyard grass (8.6)
   crabgrass
   fall panicum
   green foxtail (8.3)
   Persian darnel (8.7)
   quackgrass (6.0)*
   volunteer barley (8.5)
   volunteer corn (7.0)
   volunteer oats (8.4)
   volunteer spring wheat (8.4)
   wild oats (8.4)
   wild proso millet
   witchgrass
   yellow foxtail

   * Season-long control.
5. **Weeds Suppressed:** Quackgrass, foxtail barley.
6. **When Used:** Controls weeds in 1 - 6 leaf stage, optimum is 2 - 5 leaf (10 - 15 cm tall). Quackgrass up to 3 leaf (8 - 12 cm tall).

7. How to Apply:

With: Aircraft or ground equipment.

Rate:

Poast Ultra/Merge Application Rate Table

Grass species Controlled	**Grass Leaf Stage**	**Poast Ultra* Rate (mL/ac)**	**Merge** L/ac** Ground Application Water Volume 20 - 45 L/ac**	**Merge** L/ac** Ground Application Water Volume 45 - 80 L/ac**	**Merge** L/ac** Aerial Application Water Volume 10 - 20 L/ac**
A. **Annual grasses:** Barnyard grass, crabgrass (large), fall panicum, foxtail (green/yellow), Persian darnel, proso millet, volunteer corn, witchgrass.	1 - 6	130	0.2 - 0.4	0.4	0.1 - 0.2
Wild oats and Volunteer cereals **(Canola, flax and peas only)**	1 - 4				
B. **Annual grasses** listed above including Wild oats, volunteer cereals	1 - 6	190	0.2 - 0.4	0.4	0.1 - 0.2
Suppression of quackgrass (Western Canada only)	2 - 5				
C. **Quackgrass control**	up to 3	445	N/A	0.4 - 0.8	N/A
Suppression of foxtail barley plus annual grasses listed above	1 - 4				

* For band application, adjust rate per acre in relation to the band width (annual grasses only).

** For ground application, it is recommended to use 2 jugs of Merge with every jug of Poast Ultra regardless of water volume.

Water volume: Air: 10 - 20 L/ac. Ground: 20 - 45 L/ac. Dense foliage, heavy infestations and for quackgrass control: 45 - 80 L/ac.

Pressure: Air: 200 kPa. Ground: 240 kPa with low water volumes; 275 - 425 kPa with higher water volumes.

Nozzles: Flat fan only. Tilt forward 45° for better coverage. **The use of flood jet or hollow cone nozzles is not recommended because of uneven and inadequate spray coverage.**

Pea Pack (cont'd)

16. **Storage**:

Sencor 75DF: No damage by freezing, but avoid large temperature fluctuations. Store in a cool, dry place.

MCPA-Na: If frozen, warm to 5 C and mix well before using.

Poast Ultra *(sethoxydim)*

Group 1

Manufacturer: **BASF**

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate: 450 g/L: 1 x 7.7 L Poast Ultra + 2 x 8.1 L Merge.
2. **Registered Mixes**:

Canola: Lontrel, Muster, Pursuit (SMART canola only), Liberty (Liberty Link canola only).

Flax: Buctril M, MCPA Ester, Lontrel, Lontrel + MCPA Ester.

Peas (dry): Pursuit.

Mixing instructions:

Poast Ultra + Pursuit: A reduced rate of Pursuit (42.5 mL/acre) can be used when Poast Ultra and Pursuit are tank mixed. Do not use a rate of Poast Ultra less than 190 mL/acre in tank mixes with Pursuit.

Poast Ultra + Liberty + Merge: A reduced rate of Poast Ultra (95 mL/ac) can be tank mixed with Liberty to control volunteer barley. Merge should be added at 200 mL/ac using 45 mL/ac water volume. Refer to Liberty label for use instructions.

Usual mix order	**Mix order exceptions**
1. Poast Ultra	1. Muster
2. Broadleaf herbicide	2. Poast Ultra
3. Merge	3. Merge

3. **Crops:** Alfalfa (seedling and established), beans [adzuki, dry common, faba, lima, mung, snap, common (9.0)], buckwheat, caraway, coriander, cucumbers* (8.9), dill, flax (including low linolenic) (9.0), forage legumes for seed (seedling and established: alfalfa, alsike clover, cicer milkvetch, sainfoin, sweet clover), garlic, lentils (9.0), creeping red fescue (seed production only), linola, onions [dry bulb (8.8)], peas [dry, fresh, processing (9.0)], potatoes (9.0), rapeseed [including canola (9.0)], soybeans (9.0), sugar beets (9.0), tomatoes, broccoli, cabbage, cauliflower, safflower, mint crops (spearmint, peppermint), cranberry, chickpeas.
4. **Weeds Controlled**:

barnyard grass (8.6)
crabgrass
fall panicum
green foxtail (8.3)
Persian darnel (8.7)
quackgrass (6.0)*
volunteer barley (8.5)
volunteer corn (7.0)
volunteer oats (8.4)
volunteer spring wheat (8.4)
wild oats (8.4)
wild proso millet
witchgrass
yellow foxtail

* Season long control

5. **Weeds Suppressed**: Quackgrass, foxtail barley.
6. **When Used**: Controls weeds in 1 - 6 leaf stage, optimum is 2 - 5 leaf (10 - 15 cm tall). Quackgrass up to 3 leaf (8 - 12 cm tall).

7. How to Apply:

With: Aircraft or ground equipment.

Rate:

Poast Ultra/Merge Application Rate Table

Grass species Controlled	Grass Leaf Stage	Poast Ultra* Rate (mL/ac)	Merge** L/ac		
			Ground Application Water Volume		Aerial Application Water Volume
			20 - 44 L/ac	45 - 80 L/ac	10 - 20 L/ac
A. **Annual grasses**: Barnyard grass, crabgrass (large), fall panicum, foxtail (green/yellow), Persian darnel, proso millet, volunteer corn, witchgrass	1 - 6	130	0.2 - 0.4	0.4	0.1 - 0.2
Wild oats and Volunteer cereals **(Canola, flax and peas only)**	1 - 4				
B. **Annual grasses** listed above including Wild oats, volunteer cereals	1 - 6	190	0.2 - 0.4	0.4	0.1 - 0.2
Suppression of quackgrass (Western Canada only)	2 - 5				
C. **Quackgrass control**	up to 3	445	N/A	0.4 - 0.8	N/A
Suppression of foxtail barley plus annual grasses listed above	1 - 4				

* For band application, adjust rate per acre in relation to the band width (annual grasses only).

** For ground application, it is recommended to use 2 jugs of Merge with every jug of Poast Ultra regardless of water volume.

Water volume: Air: 10 - 20 L/ac. Ground: 20 - 45 L/ac. Dense foliage, heavy infestations and for quackgrass control: 45 - 80 L/ac.

Pressure: Air: 200 kPa. Ground: 240 kPa with low water volumes; 275 - 425 kPa with higher water volumes.

Nozzles: Flat fan only. Tilt forward 45° for better coverage. **The use of flood jet or hollow cone nozzles is not recommended because of uneven and inadequate spray coverage.**

Poast Ultra (cont'd)

8. **Application Tips:**
Poast Ultra applied at 130 mL/ac for the control of wild oats and volunteer cereals should only be applied under the following conditions:
– adequate moisture
– adequate fertility
– moderate temperatures (15°C - 28°C)
– absence of stress
– canola, flax and peas only (good crop stand is essential)
– early timing (1 - 4 true leaf stage of volunteer cereals and wild oats)
– light to moderate weed infestation levels
– low water volumes (20 - 40 L/ac)
Treat when weedy grasses are actively growing, there is good soil moisture and crop is small enough to permit thorough spray coverage. If annual grass weeds and broadleaf weeds are not in the correct stages for treatment, apply separate applications of each herbicide. Control of grasses growing under drought, flooding or prolonged cool temperatures under 15°C may be reduced or delayed. Escapes or re-tillering may occur under prolonged stress conditions or low fertility. **Do not apply on grasses stressed longer than 20 days due to lack of moisture as unsatisfactory control can result.** Thorough pre-plant tillage operations are required to fields where sod or forage grass crops may have grown in the previous year. For quackgrass only on cultivated land, pre-plant tillage will fragment rhizomes and improve control. Crop competition generally enhances control of quackgrass. In wide row crops, the quackgrass treatment should be followed by a cultivation after a minimum 7 days. Do not apply where runoff or erosion is likely. Allow 4 days between application of Poast Ultra and any other chemical not recommended as a tank mix combination. Do not allow mixtures to stand. Thoroughly clean sprayer after use by flushing with water and detergent. Prior to using Poast Ultra, ensure that the sprayer has been cleaned according to previous product manufacturer's specifications or sprayer cleanout recommendations.
When tank mixing with Pursuit, the rate of Pursuit can be lowered to 42.5 mL/ac for the control of redroot pigweed, stinkweed, wild buckwheat, wild mustard, chickweed, cleavers, hemp-nettle and smartweed.

9. **How it Works:** Poast Ultra is a contact and a systemic herbicide. Absorbed primarily by foliage and translocated to the growing points. Inhibits formation of fatty acids in these tissues. Thorough coverage of the foliage is important for consistent grass control.

10. **Expected Results:** Susceptible grasses stop growing immediately, gradually turn yellow and then brown. The time required for complete control is normally 7 - 21 days (annual grasses). Control of quackgrass develops more slowly than control of annual grasses. Poast Ultra is translocated through the quackgrass plant to the rhizomes and kills actively growing rhizome buds, as well as above ground vegetation. Dormant rhizome buds will remain unaffected by the spray and regrowth can occur from these buds. The regrowth will not be significant until 6 - 8 weeks after treatment, depending on growing conditions, crop cultivation practices and crop competition.

11. **Effects of Rainfall:** Rainfall within 1 hour of application may reduce effectiveness.

12. **Movement in Soil:** Relatively immobile, breaks down rapidly in soil.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Succeeding crops: Allow a minimum of 14 days between application and re-planting of cereal or grass crop. A cultivation to a minimum depth of 10 cm is recommended 7 days prior to seeding. Otherwise no restriction.

    Spray to harvest interval (days): Alfalfa (70), beans [snap (56), common (60), white, kidney, pinto (80), adzuki, faba, lima, mung (80)], buckwheat (85), cucumbers (30); flax (60), garlic (50), lentils (65), onions (50); peas [fresh (30), processing (30), dry (60)], potatoes (80), rapeseed (70), soybeans (80); sugar beets (85), tomatoes (60).

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = formulation (2,500). Causes moderate skin and eye irritation. Low toxicity to birds, fish and bees. Hazards to the environment are low because of rapid breakdown in soil.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store product in a cool, dry place. Freezing will not reduce effectiveness.

Prestige *(fluroxypyr + clopyralid + MCPA ester)*

Group 4

Manufacturer: **Dow AgroSciences Canada Inc.**

1. **Formulations :**
   Prestige A: Fluroxypyr, 180 g/L, 6.4 L jug.
   Prestige B: Clopyralid 50 g/L + MCPA ester, 280 g/L, 2 x 8.0 L jugs.
2. **Registered Mixes:** None.
3. **Crops:** Wheat (spring wheat only), barley.
4. **Weeds Controlled:**

Canada thistle (8.5)**
annual sow-thistle (8.7)
cleavers (1-4 whorls)(8.7)
common groundsel (8.9)
dandelion (8.0)*
flixweed*
kochia***
lamb's-quarters
perennial sow-thistle**
redroot pigweed (8.5)
round-leaved mallow (1 - 6 leaf)(8.6)
scentless chamomile
shepherd's-purse (9.0)
smartweed (8.4)
stork's-bill (8.3)
stinkweed (8.9)
tartary buckwheat
volunteer canola (8.9)
volunteer flax (1 - 12 cm)(8.9)
volunteer sunflower
wild buckwheat (1 - 4 leaf)(8.7)
wild mustard (9.0)

* Spring rosettes only
** Season-long control, with some regrowth in the fall (top growth control).
*** Including biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.

5. **Weeds Suppressed:** Common chickweed***, hemp-nettle (2 - 6 leaf stage)(8.3).
   *** Including biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.
6. **When Used:**
   Cereals: 3 leaf to just before flag leaf stage.
   Weeds: Actively growing and in seedling stage stage.
7. **How to Apply:**
   With: Ground equipment. Do not apply by air.
   Rate: Always keep the same proportions of Prestige A and Prestige B when mixing less than a full tank.

Water volume	Prestige A	Prestige B
45 L/ac	320 mL/ac	809 mL/ac

Pressure: 200 - 270 kPa.

Nozzels: Flat fan type.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store product in a cool, dry place. Freezing will not reduce effectiveness.

Prestige *(fluroxypyr + clopyralid + MCPA ester)*

Group 4

Manufacturer: **Dow AgroSciences Canada Inc.**

1. **Formulations :**
   Prestige A: Fluroxypyr, 180 g/L, 6.4 L jug.
   Prestige B: Clopyralid 50 g/L + MCPA ester, 280 g/L, 2 x 8.0 L jugs.
2. **Registered Mixes:** None.
3. **Crops:** Wheat (spring wheat only), barley.
4. **Weeds Controlled:**

Canada thistle (8.5)**
annual sow-thistle (8.7)
cleavers (1-4 whorls)(8.7)
common groundsel (8.9)
dandelion (8.0)*
flixweed*
kochia***
lamb's-quarters
perennial sow-thistle**
redroot pigweed (8.5)
round-leaved mallow (1 - 6 leaf)(8.6)
scentless chamomile
shepherd's-purse (9.0)
smartweed (8.4)
stork's-bill (8.3)
stinkweed (8.9)
tartary buckwheat
volunteer canola (8.9)
volunteer flax (1 - 12 cm)(8.9)
volunteer sunflower
wild buckwheat (1 - 4 leaf)(8.7)
wild mustard (9.0)

* Spring rosettes only
** Season long control, with some regrowth in the fall (top growth control).
*** Including biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.

5. **Weeds Suppressed:** Common chickweed***, hemp-nettle (2 - 6 leaf stage)(8.3).
   *** Including biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.
6. **When Used:**
   Cereals: 3 leaf to just before flag leaf stage.
   Weeds: Actively growing and in seedling stage stage.
7. **How to Apply:**
   With: Ground equipment. Do not apply by air.
   Rate: Always keep the same proportions of Prestige A and Prestige B when mixing less than a full tank.

Water volume	Prestige A	Prestige B
45 L/ac	320 mL/ac	809 mL/ac

Pressure: 200 - 270 kPa.
Nozzels: Flat fan type.

Prestige (cont'd)

Mixing Instructions: Use only sprayers with good agitation. Ensure that sprayer is properly cleaned prior to applying Prestige.

1. Fill the sprayer with half the required amount of clean water, start agitation and continue agitation throughout the mixing and spraying procedure.
2. Add required amount of Prestige A and then Prestige B.
3. Complete filling the sprayer tank.

8. **Application Tips:** Prestige is a non-residual herbicide and will only control emerged weeds. Prestige activity is infuenced by weather conditions. Optimum activity requires active weed growth. Temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, e.g. heat, drought or cold, or if weeds have initiated flowering or if heavy infestations exist. Wet foliage at time of application may result in reduced weed control. Optimum timing of application is 2 - 4 leaf stage of weeds. **Do not apply to wheat and barley underseeded to legumes.** Make only one application per year. Do not apply before 3 leaf stage or later than flag leaf stage of crop.

9. **How it Works:** Prestige herbicide tank mix does not control weeds that have not emerged at the time of application. The components of Prestige tank mix move within the plant to control exposed and underground plant tissue. The herbicide mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

10. **Expected Results:** Weeds start to twist shortly after being sprayed. After twisting and bending, plants stop growing, turn brown and die. Difficult-to-control weeds such as Canada thistle and wild buckwheat stop growing, change color to dark green and then turn yellow. Death may not occur for 14 - 21 days. Some weak Canada thistle regrowth may occur by the end of season

11. **Effects of Rainfall:** Do not apply if rain is expected within 6 hours.

12. **Movement in Soil:** Pestige A is bound tightly to soil organic matter but not readily bound to sand, silt or clay. Due to the relatively short half life of Prestige A, it rarely moves deeper than 15 cm in soil. Prestige B is made up of MCPA and clopyralid. MCPA is readily leached from soil. Clopyralid is somewhat soluble in water, but is generally not mobile in soil under typical prairie conditions.

13. **Grazing and Cropping Restrictions:** Do not cut or graze fields of treated wheat or barley within 7 days after application. Do not harvest the treated mature crop within 60 days after application.

    Succeeding crops: Fields previously treated with Prestige herbicide tank mix can be seeded the following year to wheat, barley, oats, rye, canola and mustard or fields can be summer fallowed. Do not seed crops other than those listed above for at least one year following treatment.

    Drift: Broadleaf crops are sensitive to spray drift. Minimize drift by using nozzles that put out sufficient spray volume and large droplets.

14. **Toxicity:**

    Prestige A: Very low mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) > 2000 mg/kg.

    Prestige B:

    Clopyralid: Very low acute mammalian toxicity. Acute LD_{50} (rats) (mg/kg) > 2000.

    MCPA: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700 - 800). May case burns upon contact with skin and eyes and can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a dry, heated area. If product is frozen, bring to room temperature and agitate before use.

17. **Resistance Management:** Natural populations of certain weeds have developed resistance to some herbicides. To delay the selection of resistant weed populations, rotate the use of herbicides with different modes of action. Prestige herbicide tank mix can be used in a weed resistance management program to delay selection for kochia, chickweed or other susceptible weeds resistant to Group 2 herbicides that inhibit the ALS/AHAS enzyme.

Prevail *(tralkoxydim + clopyralid + MCPA ester)*

Group 1,4

Manufacturer: **Dow AgroSciences Canada Inc.**

CAUTION POISON

1. **Formulations:**
   1. Prevail A (tralkoxydim); dispersible granule: 80% 2 kg carton
   2. Prevail B 50 g a.e./l clopyralid + 280 g a.e./L, MCPA ester 2 x 8 L jug
   3. Prevail C adjuvant 1 x 4 L jug
2. **Registered Mixes:** None.

   Mixing instructions: Recommended mixing order: Prevail A from all cartons, Prevail B and then Prevail C.
3. **Crops:** Wheat (spring, durum), barley.
4. **Weeds Controlled:**

   annual sow-thistle
   Canada thistle* (8.0)
   common groundsel
   dandelion**
   flixweed**
   green foxtail (wild millet)
   kochia (suppression) (2 - 4 leaf)
   lamb's-quarters (8.9)
   perrenial sow-thistle (top growth)
   Persian darnel
   redroot pigweed
   Russian pigweed
   scentless chamomile (2 - 4 leaf)
   shepherd's-purse**
   smartweed (7.7)
   stinkweed** (9.0)
   tartary buckwheat
   volunteer rapeseed (8.9)
   wild buckwheat (8.6)
   wild mustard (8.6)
   wild oats (8.6)

   * Season-long control; with some re-growth in the fall.
   ** Spring rosettes only.
5. **Weeds Suppressed:** None.
6. **When Used:**

   Cereals: 3 leaf to expanded 6 leaf stage of crop.

   Wild oats: 1 - 6 leaf stage of growth (up to emergence of third tiller).

   Green foxtail: 1 - 5 leaf stage of growth (up to emergence of second tiller).

   Broadleaf weeds: 1 - 4 leaf stage of growth.

   Canada thistle: 10 - 15 cm in height.
7. **How to Apply:**

   With: Ground equipment only. With sprayers that can apply 45 L/ac spray solution because lower water volumes can cause mixing problems, and/or unacceptable crop injury can occur.

   Rate: Always keep the same proportions of Prevail A, B and C (below) when mixing less than a full tank.

Water volume	Prevail A	Prevail B	Prevail C
45 L/ac	100 g/ac	0.8 L/ac	0.5 L/100 L spray solution

17. **Resistance Management:** Natural populations of certain weeds have developed resistance to some herbicides. To delay the selection of resistant weed populations, rotate the use of herbicides with different modes of action. Prestige herbicide tank mix can be used in a weed resistance management program to delay selection for kochia, chickweed or other susceptible weeds resistant to Group 2 herbicides that inhibit the ALS/AHAS enzyme.

Prevail *(tralkoxydim + clopyralid + MCPA ester)*

Group 1,4

CAUTION POISON

Manufacturer: **Dow AgroSciences Canada Inc.**

1. **Formulations:**
   1. Prevail A (tralkoxydim); dispersible granule: 80% 2 kg carton
   2. Prevail B 50 g a.e./l clopyralid + 280 g a.e./L, MCPA ester 2 x 8 L jug
   3. Prevail C adjuvant 1 x 4 L jug
2. **Registered Mixes:** None.

   Mixing instructions: Recommended mixing order: Prevail A from all cartons, Prevail B and then Prevail C.
3. **Crops:** Wheat (spring, durum), barley.
4. **Weeds Controlled:**

annual sow-thistle
Canada thistle* (8.0)
common groundsel
dandelion**
flixweed**
green foxtail (wild millet)
kochia (suppression) (2 - 4 leaf)
lamb's-quarters (8.9)
perrenial sow-thistle (top growth)
Persian darnel
redroot pigweed
Russian pigweed
scentless chamomile (2 - 4 leaf)
shepherd's-purse**
smartweed (7.7)
stinkweed** (9.0)
tartary buckwheat
volunteer rapeseed (8.9)
wild buckwheat (8.6)
wild mustard (8.6)
wild oats (8.6)

* Season long control: with some re growth in the fall.

** Spring rosettes only.

5. **Weeds Suppressed:** None.
6. **When Used:**

   Cereals: 3 leaf to expanded 6 leaf stage of crop.

   Wild oats: 1 - 6 leaf stage of growth (up to emergence of third tiller).

   Green foxtail: 1 - 5 leaf stage of growth (up to emergence of second tiller).

   Broadleaf weeds: 1 - 4 leaf stage of growth.

   Canada thistle: 10 - 15 cm in height.
7. **How to Apply:**

   With: Ground equipment only. With sprayers that can apply 45 L/ac spray solution because lower water volumes can cause mixing problems, and/or unacceptable crop injury can occur.

   Rate: Always keep the same proportions of Prevail A, B and C (below) when mixing less than a full tank.

Water volume	Prevail A	Prevail B	Prevail C
45 L/ac	100 g/ac	0.8 L/ac	0.5 L/100 L spray solution

Prevail (cont'd)

Mixing instructions:

1. Only use sprayers with high agitation. Ensure the sprayer is properly cleaned prior to applying Prevail.
2. Add 3/4 required amount of water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Do not enlarge the opening of the Prevail box. Remove strainer screen from filler opening of spray tank. Add Prevail slowly. Prevail A must be added directly into the sprayer through the tank opening and not through injector or hopper systems. For shallow spray tanks where water depth is 60 cm (24 inches) or less, add Prevail A towards agitator unit and away from outlet in the bottom of the tank to enhance dispersion. If more than one case of Prevail A is used, add Prevail A from all cases first prior to adding Prevail B and Prevail C.
3. Wait at least one minute after the last of the Prevail A has been added to the tank to allow for complete dispersion of the granules. A longer agitation period may be required to disperse Prevail A when using cold water (less than 5°C).
4. Add Prevail B and C.
5. Add remaining amount of water.
6. Always ensure the agitator is running until spraying is completed, even if stopping for brief periods. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to respraying.

Note: Prevail must be sprayed within the same day of mixing.

Pressure: 275 kPa.

Nozzles: Flat fan type. 50 mesh or larger screens.

8. **Application Tips:** Do not apply if crop is under extreme drought stress or showing effects of excessive moisture. When grasses are stressed due to drought, heat, lack of fertility, flooding or prolonged cool temperature, control can be reduced or delayed since grasses are not actively growing. Apply to young actively growing weeds. Do not make applications to weeds stressed longer than 20 days due to lack of moisture or unsatisfactory control will result. Cereal crops exposed to temperatures below 5°C up to 48 hours before or after application may incur unacceptable injury. Unacceptable injury could also occur when application is made to crops under stress due to foliar diseases or lack of fertility. Allow a minimum of 7 days between application of Prevail and any other herbicide. Do not apply to wheat or barley which has been underseeded to forages or other companion crops. **Do not make more than one application of Prevail during the gowing season.**

9. **How it Works:** Tralkoxydim is translocated quickly after application to the growing points and youngest leaves. Weed growth stops almost immediately. First visible symptoms occur within a few days to 1 week, depending on the speed of growth of the plants, and appear in the form of yellowing. Clopyralid is a growth regulator type of herbicide, which is primarily absorbed through the foliage and is translocated to all parts of the plant causing leaves and stems to twist, yellow and then die. MCPA is a systemic herbicide for broadleaf weeds that is translocated throughout the plant causing rapid undifferentiated growth, which usually results in the death of susceptible weeds.

10. **Expected Results:**

    Grassy weeds: Growth stops in 48 hours. Young shoots turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks.

    Broadleaf weeds: Weeds start to twist after spraying and after twisting and bending, plants turn brown and die.

    Difficult to control weeds such as Canada thistle and wild buckwheat stop growing, change color to dark green and then turn yellow before they die. Death may not occur for 14 - 21 days after application. Some weak Canada thistle regrowth may occur by end of season.

11. **Effects of Rainfall:** Do not apply if rain is forecast within 6 hours.

12. **Movement in Soil:** Prevail A is not mobile in soil. MCPA is readily leached from soil. Clopyralid is somewhat soluble in water but is generally not mobile in soil under typical prairie conditions.

13. **Grazing and Cropping Restrictions:** Do not harvest grain until 60 days after treatment with Prevail Herbicide Tank Mix. **Do not** graze or cut for feed immature crops treated with Prevail Herbicide Tank Mix. Straw from treated fields may not be used to feed to livestock. There are insufficient data to support such use.

Succeeding crops: Fields previously treated with Prevail Herbicide Tank Mix can be seeded to wheat, barley, oats, rye, corn, flax, canola, sugar beets, mustard, forage grasses or should be summerfallowed. Do not seed crops other than those listed above for at least one year following treatment. **Do not** seed pea, lentil, sunflower, bean, alfalfa or clover crops for one year following treatment.

14. **Toxicity:**

Tralkoxydim: Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 5,000. Treat symptomatically for ingestion and/or skin and eye contact. Avoid respiratory depressants unless otherwise indicated.

Clopyralid: Very low acute mammalian toxicity. Acute oral LC_{50} (rats) = greater than 2,000 mg/kg. Acute oral LD_{50} (bees) = greater than 100 μg/bee. Extremely low toxicity to fish.

MCPA: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (700 - 880). Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place. Keep packages dry at all times. If any component is frozen, bring up to room temperature and agitate.

Primextra Light *(metolachlor + atrazine)*

Group 5,15

Manufacturer: **Novartis Crop Protection Canada Inc.**

1. **Formulations:** Flowable; 330 g/L metolachlor + 161.5 g/l atrazine + 8.5 g/L related active triazines; 2 x 10 L pack.
2. **Registered Mixes:** Nitrogen fertilizer solutions may replace all or part of the water carrier on preplant applications. Same day granular fertilizers may be impregnated with Primextra.
3. **Crops:** Corn (field, silage, sweet).
4. **Weeds Controlled:**

American nightshade
annual smartweed
barnyard grass
crabgrass
Eastern Black nightshade
fall panicum
green foxtail
lady's-thumb
lamb's-quarters
prostrate pigweed
purslane
ragweed
redroot pigweed
wild buckwheat
wild mustard
witchgrass
yellow foxtail
yellow nutsedge

5. **Weeds Suppressed:** None.
6. **When Used:** Spring applied: pre-plant incorporated or banded. Pre-emergent (under irrigation only).
7. **How to Apply:**

With: Ground equipment.

Rate: 2.3 - 3.1 L/ac. Infestation Level: Light 2.3 L/ac; Medium 2.6 L/ac; Heavy 3.1 L/ac.

Water volume: 60 - 120 L/ac.

Pressure: 200 - 300 kPa.

Nozzles: Use metal filters and screens 50 mesh or larger.

Incorporation: Broadcast and lightly harrow before planting. Do not exceed 5 cm depth. Band treatment: mount a press wheel ahead of the nozzle to level the band.

8. **Application Tips:** Dry granular fertilizer may be impregnated for pre-plant, incorporated application. A minimum fertilizer rate of 90 kg/ac must be used.
9. **How it Works:** Absorbed by roots and inhibits photosynthesis.
10. **Expected Results:** Weeds die at germination or under dry conditions, die-back soon after emergence.
11. **Effects of Rainfall:** Enhances results.
12. **Movement in Soil:** Some movement may occur if there is excess moisture on light soils.
13. **Grazing and Cropping Restrictions:** Follow corn with corn only.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = atrazine (3,080), metolachlor (2,780), Primextra (4,680). May cause severe skin irritation and perhaps eye injury. Low toxicity to fish and birds. Intake may cause convulsions and coma.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Dry heated storage preferred.

Princep Nine-T/Simazine 80W/ Simazine 480 *(simazine)*

Group 5

Manufacturer: **Novartis Crop Protection Canada Inc., United Agri Products**

1. **Formulations:** Water Dispersible Granule, Princep Nine-T; 89% simazine + 1% related triazines; 5 x 5 kg bag. Wettable Powder, Simazine 80W; 79% simazine + 1% related triazines; 4 kg. Simazine 480; 480 g/L, Flowable 10 L jug.
2. **Registered Mixes:** None.
3. **Crops:**

apples
apricots
asparagus
blackberries
cherry
Christmas tree plantings
established alfalfa* (8.5)
established bird's-foot trefoil
established nursery stock*
established shelterbelts*
established woody ornamentals
field corn
high bush blueberries
loganberries
low bush blueberries
peaches
pears
plums
raspberries
sweet corn
woodland tree plantings

* Established – at least 1 year old.

4. **Weeds Controlled:**

buckwheat, wild
clovers, volunteer
crabgrass
foxtail, yellow
grass, barnyard
lady's-thumb
lamb's-quarters
oats, wild
purslane
ragweed
smartweeds, annual
most seedling perennials

5. **Weeds Suppressed:** None.
6. **When Used:** Prior to weed emergence. May be applied in either the spring or fall, prior to freeze-up.

Alfalfa, bird's-foot trefoil: Late fall.

Asparagus, blueberries: Early spring.

Corn: Within 3 days of seeding.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

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Raspberries: Early spring but not on young shoots.

Shelterbelts (established): Fall or in spring prior to weed emergence.

7. **How to Apply:**

With: Ground equipment.

Rate: (On established stands only: at least 1 year old)

[illegible]	[illegible]	[illegible]	[illegible]
alfalfa, bird's-foot trefoil	0.45 kg	0.51 kg	—
asparagus, blackberries, blueberries (high bush), nursery stock, woody ornamentals	1 - 1.5 kg	1.11 - 1.72 kg	1.9 - 2.8 L
blueberries (low bush)	0.6 - 0.8 kg	—	—
corn	0.6 - 1 kg	0.80 - 1.10 kg	1.4 - 3.4 L
loganberries	1.5 - 2.4 kg	—	—
raspberries	0.8 - 1 kg	0.9 - 1.1 kg	1.5 - 1.9 L
shelterbelts (1 year or older), Christmas tree and woodland plantations)	2 - 2.8 kg	2.23 - 3.34 kg	3.8 - 5.7 L
First year, nonbearing fruit trees (apples, apricot cherry, peach, pear and plum)	0.45 - 0.9 kg	—	—

Water volume: 120 L/ac. Shelterbelts: 200 L/ac.

Pressure: 275 kPa.

Nozzles: Use nozzle screens of 50 mesh or larger.

Incorporation: In corn, Princep or Simazine 80W may be applied 1 week before seeding and incorporated to a depth of 2.5 cm.

8. **Application Tips:** Gentle agitation required during mixing and spraying. After any break in the spray application, agitate thoroughly. Do not overlap application. Alfalfa, bird's-foot trefoil: Do not apply to the same field for more than 3 consecutive years. Do not apply Gramoxone within 1 year after the Princep or Simazine 80W application.

9. **How it Works:** Acts through the roots of germinating weeds and inhibit photosynthesis.

10. **Expected Results:** Weed-free ground.

11. **Effects of Rainfall:** Negligible.

12. **Movement in Soil:** Very little movement is possible on clay soil, but on sandy ground with high rainfall, some leaching may occur.

13. **Grazing and Cropping Restrictions:** Allow 30 days between application and grazing of dairy, beef cattle, and sheep and 60 days between application and cutting for hay.

    Succeeding crops: Plant only corn in the treated area in the same year. Breakdown of simazine in the soil is slow and may cause injury to sensitive crops (e.g. cereals, canola, sugar beets, white beans, onions, peas, tomatoes, turnips) one or more years after application. The risk of damage to succeeding crops from simazine residues may be reduced by ploughing or deep tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the simazine levels. Uneven application, excessive sprayer overlap or applications in excess of recommended rates will result in a longer carry-over of simazine residues. A prolonged period of hot dry weather will also lengthen the time that simazine residues remain in the soil.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (5,000), Princep Nine-T (5,000). May be irritating to eyes and cause dermatitis.

Raspberries: Early spring but not on young shoots.

Shelterbelts (established): Fall or in spring prior to weed emergence.

7. **How to Apply:**

With: Ground equipment.

Rate: (On established stands only: at least 1 year old)

Crop	Quantity/ac Princep Nine-T	Quantity/ac Simazine 80W	Quantity/ac Simazine 480
alfalfa, bird's-foot trefoil	0.45 kg	0.51 kg	—
asparagus, blackberries, blueberries (high bush), nursery stock, woody ornamentals	1 - 1.5 kg	1.11 - 1.72 kg	1.9 - 2.8 L
blueberries (low bush)	0.6 - 0.8 kg	—	—
corn	0.6 - 1 kg	0.80 - 1.10 kg	1.4 - 3.4 L
loganberries	1.5 - 2.4 kg	—	—
raspberries	0.8 - 1 kg	0.9 - 1.1 kg	1.5 - 1.9 L
shelterbelts (1 year or older), Christmas tree and woodland plantations)	2 - 2.8 kg	2.23 - 3.34 kg	3.8 - 5.7 L
First year, nonbearing fruit trees (apples, apricot cherry, peach, pear and plum)	0.45 - 0.9 kg	—	—

Water volume: 120 L/ac. Shelterbelts: 200 L/ac.

Pressure: 275 kPa.

Nozzles: Use nozzle screens of 50 mesh or larger.

Incorporation: In corn, Princep or Simazine 80W may be applied 1 week before seeding and incorporated to a depth of 2.5 cm.

8. **Application Tips:** Gentle agitation required during mixing and spraying. After any break in the spray application, agitate thoroughly. Do not overlap application. Alfalfa, bird's-foot trefoil: Do not apply to the same field for more than 3 consecutive years. Do not apply Gramoxone within 1 year after the Princep or Simazine 80W application.

9. **How it Works:** Acts through the roots of germinating weeds and inhibit photosynthesis.

10. **Expected Results:** Weed-free ground.

11. **Effects of Rainfall:** Negligible.

12. **Movement in Soil:** Very little movement is possible on clay soil, but on sandy ground with high rainfall, some leaching may occur.

13. **Grazing and Cropping Restrictions:** Allow 30 days between application and grazing of dairy, beef cattle, and sheep and 60 days between application and cutting for hay.

    Succeeding crops: Plant only corn in the treated area in the same year. Breakdown of simazine in the soil is slow and may cause injury to sensitive crops (e.g. cereals, canola, sugar beets, white beans, onions, peas, tomatoes, turnips) one or more years after application. The risk of damage to succeeding crops from simazine residues may be reduced by ploughing or deep tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the simazine levels. Uneven application, excessive sprayer overlap or applications in excess of recommended rates will result in a longer carry-over of simazine residues. A prolonged period of hot dry weather will also lengthen the time that simazine residues remain in the soil.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (5,000), Princep Nine-T (5,000). May be irritating to eyes and cause dermatitis.

Princep Nine-T/Simazine 80W/Simazine 480 (cont'd)

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in dry area, heating not required.

Prism *(rimsulfuron)*

Group 2

Manufacturer: **DuPont Canada Inc.**

CAUTION POISON

1. **Formulations:** Dry flowable; 25%; 480 g.
2. **Registered Mixes:** None.

   Surfactants: Citowett Plus, Agral 90 or Ag-Surf.
3. **Crops:** Potatoes (irrigated).
4. **Weeds Controlled:**

   barnyard grass
   fall panicum
   green foxtail
   quackgrass
   redroot pigweed
   witchgrass
   yellow foxtail
5. **Weeds Suppressed:** Lamb's-quarters.
6. **When Used:**

   Crop: Post-emergent, prior to the initiation of flowering.

   Weeds:

   Annual grasses: 1 - 6 leaf stage, maximum 2 tillers.

   Quackgrass: 3 - 6 leaf stage (less than 10 inches leaf extended).

   Broadleaf weeds: 4 - 6 leaf stage. Apply to young, actively growing broadleaf weeds before the canopy closes. Weeds emerging after treatment may not be controlled.
7. **How to Apply:**

   With: Ground equipment. Do not apply by air.

   Rate: 24 g/ac plus plus 2 L of surfactant per 1000 liters of spray solution.

   Water volume: 40 L/ac.

   Pressure: 175 - 275 kPa.

   Nozzles: Use flat fan nozzles. Use 50 mesh screens or larger.

   Mixing Instructions:
   1. Ensure that the spray tank, lines and filter are thoroughly clean.
   2. Fill the spray tank with one quarter required amount of clean water and start agitation or bypass system.
   3. Add the required amount of Prism while maintaining agitation.
   4. After Prism herbicide has been well mixed and is completely in suspension, add recommended non-ionic surfactant.
   5. Fill the remainder of the spray tank with water.
   6. On repeat tank loads, ensure that the amount of spray solution left in the spray tank from the previous load is less than 10% of the volume to be mixed.
   7. Use spray preparation within 24 hours or product degradation may occur, resulting in loss of weed control. Use vigorous agitation to thoroughly disperse spray mixtures that have been allowed to stand in the tank.
   8. **Do not** tank mix with any other chemical additives, pesticides or fertilizers.

Sprayer clean-up: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Prism when cleaning.

1. Drain and flush tank, boom and hoses with clean water for a minimum of 10 minutes. Visually inspect tank to ensure removal of all visible residues of Prism. If necessary, repeat step 1.
2. Fill tank with clean water while adding 1 litre of 3% ammonia per 100 litres of water. Flush solution through boom and hoses, then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes with agitation. Again, flush the hoses, booms and nozzles with the cleaning solution and drain the tank.
3. Remove nozzles and screens, and clean separately in bucket containing cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** During periods of stress, plants are not actively growing. When daytime temperatures, before or following application, are very hot combined with very dry conditions and low humidity, plants are under stress. Application of Prism during these periods may result in substantially reduced control. Do not apply to crop that is stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result.

9. **How it Works:** Prism is absorbed through the foliage and inhibits cell elongation.

10. **Expected Results:** Rapid cessation of weed growth; initial development of leaf chlorosis within 5 - 7 days after application. Discoloration of dying weeds may not be noticeable for 2 - 3 weeks after application, depending on growing conditions and weed susceptibility. Application to potatoes may result in temporary foliar symptoms (discoloration of younger leaves and pinching of the terminal leaf) that may be confused with symptoms of a viral disease. Early application timing may reduce the likelihood of foliar symptoms. **Poor results may be expected if** improper mixing, timing, coverage or when weeds are under stress.

11. **Effects of Rainfall:** Rainfall within 2 - 4 hours of application may lessen degree of weed control.

12. **Movement in Soil:** The soil mobility of Prism and its degradation products are negligible. Prism degrades rapidly in soil, regardless of soil type.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crops or cut for hay; sufficient data is not available to support such use. Pre-harvest interval: 30 days. Make only one application per year.

    Minimum crop rotation guidelines: The minimum interval is the time from the last application of Prism to the date of planting the rotational crop.

    Interval Prior to Planting (months after application):
    4 months: winter wheat.
    10 months: barley, soybeans, white beans, red clover, sorghum, potatoes, field corn. All other crops, field bioassay.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) is greater than 5000.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry, well-ventilated room.

17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled. To delay selection of resistant populations, rotate the use of Group 2 products with other products effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

M121

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Puma One Pass *(fenoxaprop-p-ethyl + bromoxynil + MCPA ester)*

Group 1,4,6

Manufacturer Aventis Crop Science

CAUTION POISON

1. **Formulations:**
   a) One Pass herbicide Emulsifiable Concentrate; 92 g/L; 1 x 8.1 L.
   b) Buctril M; bromoxynil 280 g/L + MCPA Ester 280 g/L; 1 x 8 L.
2. **Registered Mixes:** None.
3. **Crops:** All spring and durum wheat.
4. **Weeds Controlled:** Wild oats, green foxtail, barnyard grass.

Seedling up to 4 leaf stage	[illegible]	Seedling up to [illegible] leaf stage
American nightshade	wild tomato	common buckwheat
ball mustard		common ragweed
bluebur		lamb's-quarters
cocklebur		stinkweed
cow cockle*		tartary buckwheat
flixweed		wild buckwheat
green smartweed		wild mustard
kochia**		wormseed mustard
lady's-thumb		
night-flowering catchfly		
pale smartweed		
redroot pigweed		
Russian thistle**		
scentless chamomile***		
shepherd's-purse		
volunteer canola		
volunteer sunflower		

* In normal conditions, cow cockle will be controlled up to the 4 leaf stage. Plants beyond this stage are unlikely to be controlled.

** Spray before plants are 5 cm high.

*** Spring annuals only.

5. **Weeds Suppressed:** Canada thistle, perennial sow-thistle.
6. **When Used:**

   Spring and durum wheat: 1 - 6 leaves on main stem plus 3 tillers (prior to emergence of fourth tiller) (Zadoks 11-16,23)

   Annual grassy weeds: Wild oats, green foxtail and barnyard grass: 1 - 6 leaf stage up to emergence of the third tiller. Plants must be actively growing. Weeds that emerge after application will not be controlled.

   Broadleaf weeds: See chart above.
7. **How to Apply:**

   With: Ground equipment - recommended speed 6 - 8 kph. Do not apply by aircraft.

   Rate: One Pass herbicide at 405 mL/ac and Buctril M herbicide at 405 mL/ac.

   Water volume: 22.5 - 45 L/ac.

   Nozzles: 80° or 110° flat fan nozzles recommended.

Puma One Pass *(fenoxaprop-p-ethyl + bromoxynil + MCPA ester)*

Group 1,4,6

Manufacturer: **Aventis Crop Science**

CAUTION POISON

1. **Formulations:**
   a) One Pass herbicide Emulsifiable Concentrate; 92 g/L; 1 x 8.1 L.
   b) Buctril M: bromoxynil 280 g/L + MCPA Ester 280 g/L; 1 x 8 L.
2. **Registered Mixes:** None.
3. **Crops:** All spring and durum wheat.
4. **Weeds Controlled:** Wild oats, green foxtail, barnyard grass.

Seedling up to 4 leaf stage	Seedling up to 6 leaf stage	Seedling up to 8 leaf stage
American nightshade	wild tomato	common buckwheat
ball mustard		common ragweed
bluebur		lamb's-quarters
cocklebur		stinkweed
cow cockle*		tartary buckwheat
flixweed		wild buckwheat
green smartweed		wild mustard
kochia**		wormseed mustard
lady's-thumb		
night-flowering catchfly		
pale smartweed		
redroot pigweed		
Russian thistle**		
scentless chamomile***		
shepherd's-purse		
volunteer canola		
volunteer sunflower		

* In normal conditions, cow cockle will be controlled up to the 4 leaf stage. Plants beyond this stage are unlikely to be controlled.

** Spray before plants are 5 cm high.

*** Spring annuals only.

5. **Weeds Suppressed:** Canada thistle, perennial sow-thistle.
6. **When Used:**

   Spring and durum wheat: 1 - 6 leaves on main stem plus 3 tillers (prior to emergence of fourth tiller) (Zadoks 11-16,23)

   Annual grassy weeds: Wild oats, green foxtail and barnyard grass: 1 - 6 leaf stage up to emergence of the third tiller. Plants must be actively growing. Weeds that emerge after application will not be controlled.

   Broadleaf weeds: See chart above.
7. **How to Apply:**

   With: Ground equipment - recommended speed 6 - 8 kph. Do not apply by aircraft.

   Rate: One Pass herbicide at 405 mL/ac and Buctril M herbicide at 405 mL/ac.

   Water volume: 22.5 - 45 L/ac.

   Nozzles: 80° or 110° flat fan nozzles recommended.

Pressure: 275 kPa or 310 kPa if check valves are used.

Mixing instructions:

1. Ensure that the spray tank, lines and filter are thoroughly clean.
2. Fill the tank half full with clean water and start the agitation or bypass system.
3. Slowly add the correct amount of Buctril M herbicide component to the spray tank. Agitate thoroughly.
4. Add the contents of One Pass herbicide component.
5. Triple rinse the emptied containers into the spray tank.
6. Add the remaining amount of water while agitation continues. Spray out immediately. **Spray mixture should not be left in the tank overnight.**
7. When mixing second and subsequent tankfuls, ensure that the tank is half full of clean water prior to adding herbicide, and follow steps 2 - 6.
8. Thoroughly clean nozzles, screens and the spray tank by flushing with a water/detergent mixture after using Puma One Pass herbicide tank mix or before using any other pesticide.
9. Do not tank mix with any other chemical additives, pesticides or fertilizers unless recommended on the label.

8. **Application Tips:** A time interval of 7 days prior to or 4 days after application of Puma One Pass herbicide tank mix is required before any other pesticide can be applied, except for those recommended on the label. Application of the spray at a forward angle of 45° and higher water volumes will result in better penetration of the canopy and better coverage. Use higher water volumes under dense crop and weed canopies to ensure thorough coverage of the target weeds. During periods of stress, plants are not actively growing. Plants are under stress when daytime temperatures before or after application are very hot and are combined with very dry conditions and low humidity. Application of PUMA One Pass herbicide tank mix during these periods may result in reduced weed control (and/or crop injury). Do not apply to crop that is stressed by severe weather conditions, frost, low fertility, drought, water-saturated soil, disease or insect damage as crop injury may result.

9. **How it Works:** One Pass herbicide works by contact as well as systemic activity. It is not active in the soil. Regions of high meristematic activity, such as the root and shoot tips, are known to be affected. Buctril M - bromoxynil is a contact-type herbicide; therefore, good spray coverage is essential. It works through inhibition of photosynthesis and plant respiration. MCPA is absorbed through the leaves and is readily translocated in the plant. It shows auxin-like activity, typically displayed as twisting and deformation in broadleaf plants.

10. **Expected Results:**

    Grassy weeds: Reduction of leaf growth and chlorotic blotching within 1-3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and complete death within 14 - 21 days after application.

    Broadleaf weeds: Small burnt spots can appear on leaves within hours; death of plants usually occurs within two weeks. Thorough coverage is essential for good control. Poor results may be expected if spray coverage is inadequate or if spray penetration through the crop canopy is incomplete.

11. **Effects of Rainfall:** Do not apply if rain is expected within 1 hour after spraying.

12. **Movement in Soil:** Fenoxaprop-p-ethyl appears to undergo rapid hydrolysis in the soil; therefore, movement in the soil is negligible. Buctril M is moveable by soil water.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields. Sufficient data is not available to support such use. Pre-harvest interval: 65 days.

14. **Toxicity:** One Pass herbicide: Acute oral LD_{50} (rats) (mg/kg) = 3,735. Buctril M: High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 365. Very toxic to fish and birds. Non-toxic to bees. May cause burns and may be absorbed through the skin.

Puma One Pass (cont'd)

15. **Precautions, First Aid:** May cause eye damage. Causes eye and skin irritation. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **Do not re-enter treated areas within 12 hours of application.**
16. **Storage:** Keep away from fire or open flame or other sources of heat. Cannot be stored below freezing. If stored for 1 year or longer, shake well before using. Store the tightly closed containers away from seeds, fertilizer, plants and foodstuffs. Do not use or store in or around the home. Keep in original container during storage.
17. **Resistance Management:** Certain naturally occurring biotypes of wild oats and green foxtail have been identified as being resistant to Puma One Pass and related products (those with the same mode of action). Selection of resistant biotypes through repeated use of these herbicides in the same field may result in control failures. To delay selection for resistant population of weeds, rotate the use of Puma One Pass with herbicides that have a different mode of action.

Puma Super *(fenoxaprop-p-ethyl)*

Group 1

Manufacturer: **Aventis Crop Science**

1. **Formulations:** Emulsifiable Concentrate: 92 g/L: 2 x 8.1 L container.
2. **Registered Mixes:**

Weed Control in Spring Wheat and Durum Wheat

			Puma Super Rate	
	Tank Mix Partner	**Tank Mix Partner Rate**	**Wild oat Green foxtail Barnyard grass**	**Green foxtail only**
1	**Attain** Attain A + Attain B	243 mL/ac + 405 mL/ac	For use on spring wheat only. Do not apply on durum wheat. 405 mL/ac	202 mL/ac
2	**Thumper**	405 mL/ac	405 mL/ac	202 mL/ac
3	**Unity** Unity 280EC + Unity 75WG	202 mL/ac + 4.3 g/ac	For use on spring wheat only. Do not apply on durum wheat. 403 mL/ac	no
4	**MCPA Ester 500**	340 mL/ac	405 mL/ac	202 mL/ac
5	**MCPA Amine 500**	340 mL/ac	405 mL/ac	202 mL/ac
6	**Buctril M**	405 mL/ac	405 mL/ac	202 mL/ac
7	**Buctril M Gel**	375 mL/ac	405 mL/ac	202 mL/ac
8	**Refine Extra**	8 g/ac	405 mL/ac	202 mL/ac
9	**Refine Extra + MCPA Ester 500**	8 g/ac + 340 mL/ac	405 mL/ac	202 mL/ac
	Use only MCPA Ester 500 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			
10	**Ally**	2 - 3 g/ac	405 mL/ac	202 mL/ac
11	**Lontrel 360**	170 mL/ac	405 mL/ac	202 mL/ac
12	**Lontrel 360 + MCPA Ester 500**	170 mL/ac + 340 mL/ac	405 mL/ac	no
13	**or** **Lontrel 360 + MCPA Ester 500**	**or** 113 mL/ac + 340 - 453 mL/ac	405 mL/ac	no
	Use only MCPA Ester 500 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			
14	**Curtail M**	810 mL/ac	405 mL/ac	no
15	**2,4-D Ester 600**	283 mL/ac	405 mL/ac	202 mL/ac
16	**2,4-D Ester LV700**	243 mL/ac	405 mL/ac	202 mL/ac
17	**Estraprop**	709 mL/ac	405 mL/ac	202 mL/ac
18	**Dyvel DS**	445 mL/ac	For use on spring wheat only. Do not apply on durum wheat. no	202 mL/ac

Puma Super *(fenoxaprop-p-ethyl)*

Group 1

Manufacturer **Aventis Crop Science**

1. **Formulations:** Emulsifiable Concentrate; 92 g/L; 2 x 8.1 L container.
2. **Registered Mixes:**

Weed Control in Spring Wheat and Durum Wheat

			[illegible]	
	Tank Mix Partner	[illegible]	[illegible]	[illegible]
1	**Attain** Attain A + Attain B	243 mL/ac + 405 mL/ac	For use on spring wheat only. Do not apply on durum wheat. 405 mL/ac	202 mL/ac
2	**Thumper**	405 mL/ac	405 mL/ac	202 mL/ac
3	**Unity** Unity 280EC + Unity 75WG	202 mL/ac + 4.3 g/ac	For use on spring wheat only. Do not apply on durum wheat. 403 mL/ac	no
4	**MCPA Ester 500**	340 mL/ac	405 mL/ac	202 mL/ac
5	**MCPA Amine 500**	340 mL/ac	405 mL/ac	202 mL/ac
6	**Buctril M**	405 mL/ac	405 mL/ac	202 mL/ac
7	**Buctril M Gel**	375 mL/ac	405 mL/ac	202 mL/ac
8	**Refine Extra**	8 g/ac	405 mL/ac	202 mL/ac
9	**Refine Extra +** **MCPA Ester 500**	8 g/ac + 340 mL/ac	405 mL/ac	202 mL/ac
	Use only MCPA Ester 500 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			
10	**Ally**	2 - 3 g/ac	405 mL/ac	202 mL/ac
11	**Lontrel 360**	170 mL/ac	405 mL/ac	202 mL/ac
12	**Lontrel 360 +** **MCPA Ester 500**	170 mL/ac + 340 mL/ac	405 mL/ac	no
	or	**or**		
13	**Lontrel 360 + MCPA Ester 500**	113 mL/ac + 340 - 453 mL/ac	405 mL/ac	no
	Use only MCPA Ester 500 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			
14	**Curtail M**	810 mL/ac	405 mL/ac	no
15	**2,4-D Ester 600**	283 mL/ac	405 mL/ac	202 mL/ac
16	**2,4-D Ester LV700**	243 mL/ac	405 mL/ac	202 mL/ac
17	**Estraprop**	709 mL/ac	405 mL/ac	202 mL/ac
18	**Dyvel DS**	445 mL/ac	For use on spring wheat only. Do not apply on durum wheat. no	202 mL/ac

Puma Super (cont'd)

Weed Control in Barley

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	MCPA Ester 900	340 mL/ac	405 mL/ac	no
2	Refine Extra	8 g/ac	405 mL/ac	202 mL/ac
3	Refine Extra + MCPA Ester 900	8 g/ac + 340 mL/ac	405 mL/ac	202 mL/ac
	Use only MCPA Ester 900 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			

3. **Crops:** All spring wheats, durum wheat and barley.
4. **Weeds Controlled:** Wild oats, green foxtail, barnyard grass.
5. **Weeds Suppressed:** None.
6. **When Used:**

Crop:

Spring and durum wheat: 1 - 6 leaves on main stem plus 3 tillers (Zadoks 11-16,23).

Barley: 1 - 5 leaves on main stem plus 2 tillers (Zadoks 11-15,22).
Do not apply Puma Super alone in barley. Always tank mix with a recommended broadleaf weed partner.

Annual grassy weeds: Wild oats, green foxtail and barnyard grass: 1 - 6 leaf stage up to emergence of the third tiller. Plants must be actively growing. Weeds that emerge after application will not be controlled.

Broadleaf weeds: When tank mixing with a broadleaf weed herbicide, consult the appropriate label for proper timing of application, weeds controlled and any possible recropping restrictions.

7. **How to Apply:**

With: Ground equipment. Do not apply by aircraft.

Rate: 404 mL/ac. Under low wild oat infestations and when applying Puma Super alone in wheat: 350 mL/ac. Green foxtail control only: 202 mL/ac.

Water volume: 22.5 - 45 L/ac in wheat. 45 L/ac in barley.

Pressure: 275 kPa.

Nozzles: Only 110° or 80° flat fan nozzles are recommended. Uniform, thorough coverage is important for good control.

Mixing instructions:

1. Ensure that the spray tank is thoroughly clean.
2. Fill the tank half full with clean water and start agitation or bypass system.
3. If a broadleaf herbicide is to be tank mixed, add the broadleaf herbicide **first** prior to adding Puma Super.
4. Slowly add the correct amount of Puma Super to the spray tank. Agitate thoroughly.
5. Triple rinse the emptied containers into the spray tank.
6. Add the remaining amount of water while agitation continues. Spray out immediately. Spray mixture should not be left in tank overnight.
7. When mixing second and subsequent tankfuls, ensure that the tank is half-full of clean water prior to adding herbicide, and follow steps 2 - 6.
8. Thoroughly clean the spray tank by flushing with a water/detergent mixture after using Puma Super or before using any other pesticide.

Puma Super (cont'd)

Weed Control in Barley

			Puma Super Rate	
	Tank Mix Partner	Tank Mix Partner Rate	Wild oat Green foxtail Barnyard grass	Green foxtail only
1	MCPA Ester 500	340 mL/ac	405 mL/ac	no
2	Refine Extra	8 g/ac	405 mL/ac	202 mL/ac
3	Refine Extra + MCPA Ester 500	8 g/ac + 340 mL/ac	405 mL/ac	202 mL/ac
	Use only MCPA Ester 500 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			

3. **Crops:** All spring wheats, durum wheat and barley.
4. **Weeds Controlled:** Wild oats, green foxtail, barnyard grass.
5. **Weeds Suppressed:** None.
6. **When Used:**

Crop:

Spring and durum wheat: 1 - 6 leaves on main stem plus 3 tillers (Zadoks 11-16,23).

Barley: 1 - 5 leaves on main stem plus 2 tillers (Zadoks 11-15,22).
Do not apply Puma Super alone in barley. Always tank mix with a recommended broadleaf weed partner.

Annual grassy weeds: Wild oats, green foxtail and barnyard grass: 1 - 6 leaf stage up to emergence of the third tiller. Plants must be actively growing. Weeds that emerge after application will not be controlled.

Broadleaf weeds: When tank mixing with a broadleaf weed herbicide, consult the appropriate label for proper timing of application, weeds controlled and any possible recropping restrictions.

7. **How to Apply:**

With: Ground equipment. Do not apply by aircraft.

Rate: 404 mL/ac. Under low wild oat infestations and when applying Puma Super alone in wheat: 350 mL/ac. Green foxtail control only: 202 mL/ac.

Water volume: 22.5 - 45 L/ac in wheat. 45 L/ac in barley.

Pressure: 275 kPa.

Nozzles: Only 110° or 80° flat fan nozzles are recommended. Uniform, thorough coverage is important for good control.

Mixing instructions:

1. Ensure that the spray tank is thoroughly clean.
2. Fill the tank half full with clean water and start agitation or bypass system.
3. If a broadleaf herbicide is to be tank mixed, add the broadleaf herbicide **first** prior to adding Puma Super.
4. Slowly add the correct amount of Puma Super to the spray tank. Agitate thoroughly.
5. Triple rinse the emptied containers into the spray tank.
6. Add the remaining amount of water while agitation continues. Spray out immediately. Spray mixture should not be left in tank overnight.
7. When mixing second and subsequent tankfuls, ensure that the tank is half-full of clean water prior to adding herbicide, and follow steps 2 - 6.
8. Thoroughly clean the spray tank by flushing with a water/detergent mixture after using Puma Super or before using any other pesticide.

8. **Application Tips:** A time interval of 7 days prior to application or 4 days after application of Puma Super is required before any other pesticide can be applied, except for those recommended on the label. During periods of stress, plants are not actively growing. When daytime temperatures before and after application are very hot and combined with very dry conditions and low humidity, plants are under stress. Application of Puma Super during these periods may result in substantially reduced control. Application of the spray at a forward angle of 45° will result in better penetration of the canopy and better coverage. Do not apply to crop stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result.
9. **How it Works:** Fenoxaprop-p-ethyl: Contact as well as systemic, no soil activity. Regions of high meristematic activity, such as root and shoot tips, are known to be affected.
10. **Expected Results:**

    Grassy weeds: Reduction of leaf growth and chlorotic blotching within 1 - 3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and complete death within 14 - 21 days after application.
11. **Effects of Rainfall:** Do not apply Puma Super if rain is expected within 1 hour.
12. **Movement in Soil:** Fenoxaprop-p-ethyl appears to undergo rapid hydrolysis in the soil.
13. **Grazing and Cropping Restrictions:** Do not graze treated fields prior to harvest.

    Pre-harvest interval: 65 days.
14. **Toxicity:** Acute oral LD_{50} (rats) (mg/kg) = 3,735.
15. **Precautions, First Aid:** May cause eye damage. Causes eye and skin irritation. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **Do not re-enter treated areas within 12 hours of application.**
16. **Storage:** Keep away from fire or open flame or other sources of heat. Cannot be stored below freezing. If stored for 1 year or longer, shake well before using. Store the tightly closed containers away from seeds, fertilizer, plants and foodstuffs. Do not use or store in or around the home. Keep in original container during storage.
17. **Resistance Management:** Certain naturally occurring biotypes of wild oats and green foxtail have been identified as being resistant to Puma Super and related products (those with the same mode of action). Selection of resistant biotypes, through repeated use of these herbicides in the same field, may result in control failures. To delay selection for resistant population of weeds, rotate the use of Puma Super with herbicides that have a different mode of action.

Puma 120 Super *(fenoxaprop-p-ethyl)*

Group 1

Manufacturer: Aventis Crop Science

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; **120** g/L; 2 x 6.2 L container or 99.3 L pod container.
2. **Registered Mixes:** See tables.

Puma^{120} Super (cont'd)

Weed Control in Spring Wheat and Durum Wheat

			Puma^{120} Super Rate	
	Tank Mix Partner	**Tank Mix Partner Rate**	**Wild oat Green foxtail Barnyard grass**	**Green foxtail only**
1	**Attain** Attain A + Attain B	243 mL/ac + 405 mL/ac	For use on spring wheat only. Do not apply on durum wheat. 312 mL/ac	156 mL/ac
2	**Thumper**	405 mL/ac	312 mL/ac	156 mL/ac
3	**Mecoprop** (150 g active per litre)	2.2 - 2.8 L/ac	312 mL/ac	no
	Note: A reduction in wild oat control may be observed when Puma^{120} Super is applied in a tank mixture with Mecoprop.			
4	**Unity** Unity 280EC + Unity 75WG	202 mL/ac + 4.33 g/ac	312 mL/ac	156 mL/ac
5	**MCPA Ester 500**	340 mL/ac	312 mL/ac	156 mL/ac
6	**MCPA Amine 500**	340 mL/ac	312 mL/ac	156 mL/ac
7	**Buctril M**	405 mL/ac	312 mL/ac	156 mL/ac
8	**Buctril M Gel**	3.72 L water Soluble bags treats 10 acres	312 mL/ac	156 mL/ac
9	**Refine Extra**	8.1 g/ac	312 mL/ac	156 mL/ac
10	**Refine Extra + MCPA Ester 500**	8.1 g/ac + 340 mL/ac	312 mL/ac	156 mL/ac
	Use only MCPA Ester 500 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			
11	**Ally**	2.0 - 3.0 g/ac	312 mL/ac	156 mL/ac
12	**Lontrel 360**	170 mL/ac	312 mL/ac	156 mL/ac
13	**Lontrel 360 + MCPA Ester 500**	170 mL/ac + 340 mL/ac	312 mL/ac	no
	or	or		
14	**Lontrel 360 + MCPA Ester 500**	113 mL/ac + 340 - 453 mL/ac	312 mL/ac	no
	Use only MCPA Ester 500 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			
15	**Curtail M**	810 mL/ac	312 mL/ac	156 mL/ac
16	**2,4-D Ester 600**	283 mL/ac	312 mL/ac	156 mL/ac
17	**2,4-D Ester LV700**	243 mL/ac	312 mL/ac	156 mL/ac
18	**Estraprop**	710 mL/ac	312 mL/ac	156 mL/ac
19	**Dyvel DS**	445 mL/ac	no	156 mL/ac
20	**Dyvel**	507 mL/ac	no	156 mL/ac
21	**Prestige** Prestige A + Prestige B	324 mL/ac + 810 mL/ac	For use on spring wheat only. Do not apply on durum wheat. 312 mL/ac	156 mL/ac
22	**Express Pack** Express + 2,4-D LV700	4.0 g/ac + 243 mL/ac	no	156 mL/ac

Weed Control in Spring Barley

			Puma^{120} Super Rate	
	Tank Mix Partner	**Tank Mix Partner Rate**	**Wild oat Green foxtail Barnyard grass**	**Green foxtail only**
1	**Thumper**	405 mL/ac	312 mL/ac	156 mL/ac
2	**MCPA Ester 500**	340 mL/ac	312 mL/ac	156 mL/ac
3	**MCPA Amine 500**	340 mL/ac	312 mL/ac	156 mL/ac
4	**Buctril M**	405 mL/ac	312 mL/ac	156 mL/ac
5	**Buctril M Gel**	3.72 L water soluble bag treats 10 acres	312 mL/ac	156 mL/ac
6	**Refine Extra**	8.1 g/ac	312 mL/ac	156 mL/ac
7	**Refine Extra + MCPA Ester 500**	8.1 g/ac + 340 mL/ac	312 mL/ac	156 mL/ac
	Use only MCPA Ester 500 in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			
8	**Curtail M**	607 - 810 mL/ac	312 mL/ac	156 mL/ac
9	**Estraprop**	708 mL/ac	312 mL/ac	no
10	**Dyvel**	506 mL/ac	no	156 mL/ac
11	**Unity** Unity 280EC + Unity 75WG	202 mL/ac + 4.3 g/ac	312 mL/ac	156 mL/ac
12	**Ally**	2.0 or 3.0 g/ac	312 mL/ac	156 mL/ac
13	**Prestige** Prestige A + Prestige B	324 mL/ac + 810 mL/ac	312 mL/ac	156 mL/ac
14	**Express Pack** Express Pack + 2,4-D LV700	4 g/ac + 243 mL/ac	no	156 mL/ac

3. **Crops:** All spring wheats, durum wheat and barley.
4. **Weeds Controlled:** Barnyard grass, green foxtail, wild oats.
5. **Weeds Suppressed:** None.
6. **When Used:**

Crop	**Recommended stage**
Spring and durum wheat	1 - 6 leaves on main stem plus 3 tillers (Zadoks 11-16,23)
Barley	1 - 5 leaves on main stem plus 2 tillers (Zadoks 11-15,22)

Do not apply Puma^{120} Super alone in barley. Always tank mix with a recommended broadleaf weed partner.

Annual grassy weeds: Wild oats, green foxtail and barnyard grass: 1 - 6 leaf stage up to emergence of the third tiller. Plants must be actively growing. Weeds that emerge after application will not be controlled.

Broadleaf weeds: When tank mixing with a broadleaf weed herbicide, consult the appropriate label for proper timing of application, weeds controlled and any possible recropping restrictions.

Weed Control in Spring Barley

[illegible]			[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible] only
1	Thumper	405 mL/ac	312 mL/ac	156 mL/ac
2	MCPA Ester 500	340 mL/ac	312 mL/ac	156 mL/ac
3	MCPA Amine 500	340 mL/ac	312 mL/ac	156 mL/ac
4	Buctril M	405 mL/ac	312 mL/ac	156 mL/ac
5	Buctril M Gel	3.72 L water soluble bag treats 10 acres	312 mL/ac	156 mL/ac
6	Refine Extra	8.1 g/ac	312 mL/ac	156 mL/ac
7	Refine Extra + MCPA Ester 500	8.1 g/ac + 340 mL/ac	312 mL/ac	156 mL/ac
	Use only **MCPA Ester 500** in this tank mix and only at recommended rates. Failure to do so may result in reduced wild oat control. **DO NOT USE MCPA AMINE**			
8	Curtail M	607 - 810 mL/ac	312 mL/ac	156 mL/ac
9	Estraprop	708 mL/ac	312 mL/ac	no
10	Dyvel	506 mL/ac	no	156 mL/ac
11	Unity Unity 280EC + Unity 75WG	202 mL/ac + 4.3 g/ac	312 mL/ac	156 mL/ac
12	Ally	2.0 or 3.0 g/ac	312 mL/ac	156 mL/ac
13	Prestige Prestige A + Prestige B	324 mL/ac + 810 mL/ac	312 mL/ac	156 mL/ac
14	Express Pack Express Pack + 2,4-D LV700	4 g/ac + 243 mL/ac	no	156 mL/ac

3. **Crops:** All spring wheats, durum wheat and barley.
4. **Weeds Controlled:** Barnyard grass, green foxtail, wild oats.
5. **Weeds Suppressed:** None.
6. **When Used:**

[illegible]	[illegible]
Spring and durum wheat	1 - 6 leaves on main stem plus 3 tillers (Zadoks 11-16,23).
Barley	1 - 5 leaves on main stem plus 2 tillers (Zadoks 11-15,22).

Do not apply Puma^{120} Super alone in barley. Always tank mix with a recommended broadleaf weed partner.

Annual grassy weeds: Wild oats, green foxtail and barnyard grass: 1 - 6 leaf stage up to emergence of the third tiller. Plants must be actively growing. Weeds that emerge after application will not be controlled.

Broadleaf weeds: When tank mixing with a broadleaf weed herbicide, consult the appropriate label for proper timing of application, weeds controlled and any possible recropping restrictions.

Puma^{120} Super (cont'd)

7. **How to Apply:**

With: Ground equipment. Do not apply by aircraft.

Rate: 312 mL/ac. Under low wild oat infestations and when applying Puma^{120} Super alone in wheat: 270 mL/ac. Green foxtail control only: 156 mL/ac.

Water volume: 22.5 - 45 L/ac in wheat. 45 L/ac in barley.

Pressure: 275 kPa.

Nozzles: Only 110° or 80° flat fan nozzles are recommended. Uniform, thorough coverage is important for good control.

Mixing instructions:

1. Ensure that the spray tank [illegible] thoroughly clean.
2. Fill the tank half full with clean water and start agitation or bypass system.
3. If a broadleaf herbicide is to be tank mixed, add the broadleaf herbicide **first** prior to adding Puma^{120} Super.
4. Slowly add the correct amount of Puma^{120} Super to the spray tank. Agitate thoroughly.
5. Triple rinse the emptied containers into the spray tank.
6. Add the remaining amount of water while agitation continues. Spray out immediately. Spray mixture should not be left in the tank overnight.
7. When mixing second and subsequent tankfuls, ensure that the tank is half-full of clean water prior to adding herbicide, and follow steps 2 - 6.
8. Thoroughly clean the spray tank by flushing with a water/detergent mixture after using Puma^{120} Super or before using any other pesticide.

8. **Application Tips:** A time interval of 7 days prior to application or 4 days after application of Puma^{120} Super is required before any other pesticide can be applied, except for those recommended on the label. During periods of stress, plants are not actively growing. When daytime temperatures before and after application are very hot and are combined with very dry conditions and low humidity, plants are under stress. Application of Puma^{120} Super during these periods may result in substantially reduced control. Application of the spray at a forward angle of 45° will result in better penetration of the canopy and better coverage. Do not apply to crop stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result.

9. **How it Works:** Fenoxaprop-p-ethyl: Contact as well as systemic, no soil activity. Regions of high meristematic activity, such as root and shoot tips, are known to be affected.

10. **Expected Results:**

Grassy weeds: Reduction of leaf growth and chlorotic blotching within 1 - 3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and complete death within 14 - 21 days after application.

11. **Effects of Rainfall:** Do not apply Puma Super if rain is expected within 1 hour of application.

12. **Movement in Soil:** Fenoxaprop-p-ethyl appears to undergo rapid hydrolysis in the soil.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields prior to harvest.

Pre-harvest interval: 65 days.

14. **Toxicity:** Acute oral LD$_{50}$ (rats) (mg/kg) = 3,735.

15. **Precautions, First Aid:** May cause eye damage. Causes eye and skin irritation. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **Do not re-enter treated areas within 12 hours of application.**

16. **Storage:** Keep away from fire or open flame or other sources of heat. Cannot be stored below freezing. If stored for 1 year or longer, shake well before using. Store the tightly closed containers away from seeds, fertilizer, plants and foodstuffs. Do not use or store in or around the home. Keep in original container during storage.
17. **Resistance Management:** Certain naturally occurring biotypes of wild oats and green foxtail have been identified as being resistant to Puma^{120} Super and related products (those with the same mode of action). Selection of resistant biotypes, through repeated use of these herbicides in the same field, may result in control failures. To delay selection for resistant population of weeds, rotate the use of Puma^{120} Super with herbicides that have a different mode of action.

Pursuit *(imazethapyr)*

Group 2

Manufacturer: Cyanamid Crop Protection

1. **Formulations:** Aqueous solution; 240 g/L; 3.3 L container.
2. **Registered Mixes:**

   SMART canola: Poast.
   Field peas: Poast, Select, Venture.
   Seed alfalfa (seedling and established) and dry beans: None.

   Surfactants:
   Pursuit alone: Non-ionic surfactant (minimum of 80% active ingredient) such as Agsurf or Agral 90 or Surf 92 (added at the rate of 0.25% of the water volume).
   Tank mixes: Check Poast, Select and Venture label for recommendations.

   Mixing instructions:
   For Pursuit alone: Fill sprayer tank with 1/2 the required amount of water. Add the required amount of Pursuit herbicide while agitating, followed by the required amount of surfactant. Add remainder of water. For tank mixes, check Poast, Select and Venture label for recommendations.

   Mixing rates: 85 mL/ac of Pursuit when used alone or in tank mix.
3. **Crops:** Field peas, SMART canola, seed alfalfa (seedling and established), dry beans (pinto, pink, red).
4. **Weeds Controlled:**

   Peas and SMART canola, Chickling vetch/green pea: Chickweed, cleavers, green foxtail, hemp-nettle, redroot pigweed, shepherd's-purse, smartweed, stinkweed, volunteer canola (expect SMART canola), wild buckwheat, wild mustard, wild oats, chickling vetch/green pea.

   Dry beans: Hairy nightshade.

   Seedling alfalfa (seed): Redroot pigweed, smartweed, stinkweed, volunteer canola, wild mustard.

   Established alfalfa (seed): Redroot pigweed, stinkweed, wild mustard, volunteer canola.
5. **Weeds Suppressed:** Peas, Chickling vetch/green pea: lamb's-quarters. SMART canola: lamb's-quarters, volunteer barley, volunteer wheat, chickling vetch/green pea. Seedling alfalfa: lamb's-quarters, common groundsel, shepherd's-purse, green foxtail. Established alfalfa: green foxtail.

Pursuit (cont'd)

6. **When Used:**

   Black and Grey Wooded soil zones: Apply early post-emergence, up to the 4 true leaf stage of actively growing weeds. Wild oats: 2 - 4 leaf stage. Application can be made up to and including the 6th node stage of peas; 1 - 4 leaf stage of canola; 1 - 4 trifoliate leaf stage of alfalfa; up to 30 cm in height of established alfalfa for seed production only. For seedling alfalfa, apply only in the year of establishment and only one application of Pursuit during the life of the alfalfa stand, on stands that will remain for 3 years or more. In established alfalfa stands used for seed production only, do not make more than one application per year and do not apply in the last year of the alfalfa stand. Apply up to the second trifoliate leaf stage of the dry beans and up to the 6 leaf stage of hairy nightshade. For chickling vetch/green pea, apply at the 5 - 7 leaf stage.

   Irrigated Brown Soil Zones: In irrigated brown soil zones **for purestand alfalfa only**, Pursuit can be applied using the same crop staging and application guidelines as stated for alfalfa in the black and grey wooded soil zones.

7. **How to Apply:**

   With: Ground equipment only.

   Rate: 85 mL/ac.

   Surfactant: 1 L non-ionic surfactant/400 litres of spray solution when using Pursuit alone.

   Water volume: 40 - 160 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended; tilted 45° forward for better penetration. 50-mesh screens and filters.

   Incorporation: Not applicable.

8. **Application Tips:** Do not spray if freezing temperatures are forecast.

9. **How it Works:** Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions.

10. **Expected Results:** Susceptible weeds stop growing within 24 - 48 hours. Yellow striping and purplish or reddish discoloration of the leaves may occur. Leaves begin to die in 3 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks.

11. **Effects of Rainfall:** Rainfall within 6 hours of application may reduce activity.

12. **Movement in Soil:** Is not leached appreciably.

13. **Grazing and Cropping Restrictions:** Only one application of Pursuit may be made during the season.

    Field peas: May be fed to livestock 30 days after application.

    SMART canola: Do not graze or cut for hay, insufficient data to support such use.

    Alfalfa: May be grazed or harvested for forage 14 days after application.

    Miniumum interval to harvest: Field peas: 60 days; SMART canola 70 days; dry beans: 75 days; chickling vetch/green pea: 60 days.

    Succeeding crops:

    Black, Grey Wooded and Irrigated Brown soil zones: Spring wheat, SMART canola, field peas, lentils and alfalfa may be planted the season following a Pursuit application. Barley may be planted in the black and grey wooded soil zones the season following application. Non-SMART canola can be grown in the third year after Pursuit application (e.g., if you used Pursuit in 1996, you can grow conventional canola in 1999). Perform a bioassay on other crops prior to planting them on a field-scale. In case of crop failure, replant only to SMART canola or field peas the year of application.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) 5,000. Non-toxic to fish, birds and bees.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store at temperatures above 0°C. If product is exposed to temperatures below 0°C during shipment or storage, make sure the product has thawed completely and shake container vigorously.

Pyramin *(pyrazon)*

Manufacturer **BASF**

CAUTION POISON

1. **Formulations:** Flowable formulation 430 g/L; 3 L jugs.
2. **Registered Mixes:** Avadex BW, TCA or Ro-Neet, Nortron SC.
3. **Crops:** Sugar beets.
4. **Weeds Controlled:**
   - black nightshade
   - chickweed
   - knotweed
   - lady's-thumb
   - lamb's-quarters
   - oak-leaved goosefoot
   - prostrate pigweed
   - purslane
   - ragweed
   - redroot pigweed
   - shepherd's-purse
   - smartweed
   - stinkweed
   - wild buckwheat
   - wild carrot
   - wild mustard
   - wormseed mustard
   - yellow rocket
5. **Weeds Suppressed:** None.
6. **When Used:** Pyramin may be used as a pre-plant incorporated, pre-emergent or post-emergent treatment. Post-emergent treatments should be applied before the weeds have 3 leaves.
7. **How to Apply:**

   With: Ground equipment.

   Rate: Light soils: 3.3 L/ac. Heavy soils: 4.1 L/ac.
   Nortron tank mix - Pyramin: 2.12 L/ac + Nortron SC: 1.48 L/ac.

   Water volume: 40 - 101 L/acre.

   Pressure: 275 - 350 kPa.

   Nozzles: All standard low pressure nozzles delivering 40 - 101 L/acre.

   Incorporation: Pre-plant – incorporate shallow. Fall ridging – apply Pyramin in a 17.5 cm band and cover with a 15 - 20 cm high ridge of soil. In the spring, level the ridges and leave guide marks to enable planting the bands. Avoid levelling deeper than the chemical placement.
8. **Application Tips:** Pyramin must not be mixed into soil deeper than seed is planted to reduce beet injury.
9. **How it Works:** The active ingredient in Pyramin is absorbed by the roots and is translocated to the leaves.
10. **Expected Results:**

    Weed: If adequate moisture is present, the weeds will fail to emerge. If the soil is dry for a long time, weeds that emerge and become well established will not be fully controlled, but small emerged weeds may die back, once adequate moisture is present.
11. **Effects of Rainfall:** No effect.
12. **Movement in Soil:** Pyramin does not move readily in the soil and cannot be leached out.
13. **Grazing and Cropping Restrictions:**

    Drift: Care should be taken to avoid drift onto sensitive plants such as rapeseed and mustard.

    Grazing restrictions: The tops of beets grown in Pyramin treated soil may be used for human consumption or fed to livestock.

    Cropping restrictions: None.

Pyramin (cont'd)

14. **Toxicity:** Very low acute mammalian toxicity. Oral LD_{50} (rats) = 3,030 mg/kg. No short term or long term human health problems are associated with this product when used according to label. Non-toxic to bees.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention
16. **Storage:** Store in a cool, dry place. Do not store below 0°C.

Refine Extra *(thifensulfuron methyl + tribenuron methyl)*

Group 2

Manufacturer DuPont Canada Inc

CAUTION POISON

1. **Formulations:** Dry flowable; 50% thifensulfuron methyl, 25% tribenuron methyl; Toss-N-Go 320 g (4 x 80 g) water soluble pouches.
2. **Registered Mixes:** Curtail M (600 mL/ac + surfactant); Lontrel (85 mL/ac) + surfactant; Lontrel + MCPA (83 mL/ac Lontrel + 336 mL/ac MCPA ester 500) + surfactant; Lontrel + 2,4-D (83 mL/ac Lontrel + 336 mL/ac 2,4-D amine 500 or 240 mL/ac 2,4-D ester LV700) + surfactant; Puma + Lontrel (400 mL/ac Puma + 83 mL/ac Lontrel); Accord (55 - 67 g/ac + Merge 1.0 L/100 L spray volume); Accord + Avenge 200-C (55 - 67 g/ac + 1.4 L/ac + Merge 1.0 L/100 L spray volume); MCPA (280 - 445 mL/ac amine or ester 500 + surfactant); 2,4-D (340 - 445 mL/ac amine 500 + surfactant; 280 - 365 mL/ac ester 600 + surfactant; not for use on oats). *Assert, *Assert + MCPA ester. *Avenge, *Puma (spring wheat, including durum only), *Puma + Lontrel (spring wheat only, excluding durum). *Puma + MCPA ester only (spring wheat including durum only), Horizon + Score surfactant (See Horizon label for mixing instructions), Puma Super. *Do not use surfactant when tank mixing with grass herbicide unless specified on grass herbicide label.

   Surfactants: Citowett Plus, Agral 90, Agsurf. (Use a surfactant when Refine Extra is used alone or in a mixture with MCPA or 2,4-D).
3. **Crops:** Barley, wheat (spring, winter or durum), oats. Seedling or established grasses for forage or seed production: meadow bromegrass, smooth bromegrass, creeping red fescue, orchard grass, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, slender wheatgrass, streambank wheatgrass, tall wheatgrass, northern wheatgrass, western wheatgrass, Kentucky bluegrass (established), tall fescue (seedling only).

   Underseeding: Do not apply to crops underseeded to legumes or grasses.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

REMARQUE IMPORTANTE CONCERNANT LES PAGES QUI SUIVENT

LES PAGES SUIVANTES ONT ÉTÉ REPRODUITES EN DOUBLE AFIN D'AMÉLIORER LA QUALITÉ DE REPRODUCTION

LES UTILISATEURS DOIVENT CONSULTER TOUTES LES PAGES REPRODUITES SUR LA FICHE AFIN D'OBTENIR LA LECTURE DU TEXTE INTÉGRAL

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4. Weeds Controlled:

[illegible]

ball mustard
chickweed (8.5)
common groundsel
corn spurry (8.8)
cow cockle (8.7)
flixweed
green smartweed
hemp-nettle (8.4)
kochia (8.5)
lady's-thumb
lamb's-quarters (8.6)
narrow-leaved hawk's-beard
redroot pigweed (8.4)
Russian thistle (7.9)
shepherd's-purse (8.2)
stinkweed (8.6)
tartary buckwheat (8.3)
volunteer rapeseed (excluding smart-trait)(8.6)
volunteer sunflower
wild buckwheat (7.7)
wild mustard (8.6)

[illegible]

ball mustard
burdocks (seedling)
chickweed (8.8)
cocklebur*
common groundsel
common plantain
corn spurry
cow cockle
false ragweed*
flixweed
giant ragweed*
green smartweed
hare's-ear mustard
hemp-nettle (8.2)
Indian mustard
kochia*
lady's-thumb
lamb's-quarters (8.7)
narrow-leaved hawk's-beard
prickly lettuce
ragweed* (8.3)
redroot pigweed* (8.7)
Russian pigweed*
Russian thistle
shepherd's-purse (7.9)
stinkweed (8.6)
stork's-bill (2 - 6 leaf)(8.2) (2,4-D ester only)
sweet clover**
tartary buckwheat
tumble mustard
volunteer rapeseed (including smart-trait)
volunteer sunflower
wild buckwheat (7.7)
wild mustard
wild radish
wormseed mustard

* Use a minimum of 320 mL/ac of MCPA amine 500.
** Refine Extra + 2,4-D only.

5. Weeds Suppressed: Canada thistle (7.1), sow-thistle, round-leaved mallow (6.4), cleavers (6.7), scentless chamomile (6.9), stork's-bill (6.7), toadflax [less than 15 cm tall (7.1)].

6. When Used:

Refine Extra alone: 2 leaf to flag leaf stage of barley, wheat (spring, winter and durum) and oats.

Refine Extra + MCPA or 2,4-D: Full 3 leaf to expanded shot blade of barley, wheat and oats for MCPA and barley and wheat for 2,4-D.

Refine Extra + Accord: Spring wheat, including durum at 2 - 5 leaf stage.

Weeds: Apply to young actively growing weeds before the canopy closes. Weeds emerging after treatment may not be controlled.

Wild buckwheat: Apply Refine Extra to actively growing wild buckwheat in the 1 - 3 leaf stage. Apply Refine Extra + Curtail M + surfactant to actively growing wild buckwheat in the cotyledon to 5 leaf stage.

Cleavers: Apply Refine Extra at 1 - 3 whorl stage.

Canada thistle, sow-thistle: Apply Refine Extra plus surfactant post emergent when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are not larger than 15 cm tall, before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistle will not be controlled. Apply Refine Extra + Curtail M + surfactant postemergent when the majority of the thistles have emerged and are actively growing. For best control, apply when thistles are no larger than 15 cm tall, before the bud stage and before crop canopy prevents thorough coverage of the thistles. Later emerging thistles will not be controlled.

Chickweed: Apply Refine Extra plus surfactant when the chickweed is small (1 - 6 leaf) and actively growing but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled.

4. Weeds Controlled:

Refine Extra 8 g/ac alone

- ball mustard
- chickweed (8.5)
- common groundsel
- corn spurry (8.8)
- cow cockle (8.7)
- flixweed
- green smartweed
- hemp-nettle (8.4)
- kochia (8.5)
- lady's-thumb
- lamb's-quarters (8.6)
- narrow-leaved hawk's-beard
- redroot pigweed (8.4)
- Russian thistle (7.9)
- shepherd's-purse (8.2)
- stinkweed (8.6)
- tartary buckwheat (8.3)
- volunteer rapeseed (excluding smart-trait)(8.6)
- volunteer sunflower
- wild buckwheat (7.7)
- wild mustard (8.6)

Refine Extra 8 g/ac + MCPA or 2,4-D

- ball mustard
- burdocks (seedling)
- chickweed (8.8)
- cocklebur*
- common groundsel
- common plantain
- corn spurry
- cow cockle
- false ragweed*
- flixweed
- giant ragweed*
- green smartweed
- hare's-ear mustard
- hemp-nettle (8.2)
- Indian mustard
- kochia*
- lady's-thumb
- lamb's-quarters (8.7)
- narrow-leaved hawk's-beard
- prickly lettuce
- ragweed* (8.3)
- redroot pigweed* (8.7)
- Russian pigweed*
- Russian thistle
- shepherd's-purse (7.9)
- stinkweed (8.6)
- stork's-bill (2 - 6 leaf)(8.2) (2,4-D ester only)
- sweet clover**
- tartary buckwheat
- tumble mustard
- volunteer rapeseed (including smart-trait)
- volunteer sunflower
- wild buckwheat (7.7)
- wild mustard
- wild radish
- wormseed mustard

* Use a minimum of 320 mL/ac of MCPA amine 500.

** Refine Extra + 2,4-D only.

5. Weeds Suppressed: Canada thistle (7.1), sow-thistle, round-leaved mallow (6.4), cleavers (6.7), scentless chamomile (6.9), stork's-bill (6.7), toadflax [less than 15 cm tall (7.1)].

6. When Used:

Refine Extra alone: 2 leaf to flag leaf stage of barley, wheat (spring, winter and durum) and oats.

Refine Extra + MCPA or 2,4-D: Full 3 leaf to expanded shot blade of barley, wheat and oats for MCPA and barley and wheat for 2,4-D.

Refine Extra + Accord: Spring wheat, including durum at 2 - 5 leaf stage.

Weeds: Apply to young actively growing weeds before the canopy closes. Weeds emerging after treatment may not be controlled.

Wild buckwheat: Apply Refine Extra to actively growing wild buckwheat in the 1 - 3 leaf stage. Apply Refine Extra + Curtail M + surfactant to actively growing wild buckwheat in the cotyledon to 5 leaf stage.

Cleavers: Apply Refine Extra at 1 - 3 whorl stage.

Canada thistle, sow-thistle: Apply Refine Extra plus surfactant post emergent when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are not larger than 15 cm tall, before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistle will not be controlled. Apply Refine Extra + Curtail M + surfactant postemergent when the majority of the thistles have emerged and are actively growing. For best control, apply when thistles are no larger than 15 cm tall, before the bud stage and before crop canopy prevents thorough coverage of the thistles. Later emerging thistles will not be controlled.

Chickweed: Apply Refine Extra plus surfactant when the chickweed is small (1 - 6 leaf) and actively growing but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled.

Refine Extra (cont'd)

Round-leaved mallow: Apply Refine Extra plus surfactant to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height). Refine Extra will keep mallow stunted but may not reduce the overall populations.

Toadflax: Apply Refine Extra plus surfactant when toadflax is no taller than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application.

7. **How to Apply:**

   With: Ground equipment. Do not apply by air.

   Rate: Barley, wheat (spring, winter, durum), oats: Refine Extra 8 g/ac.

   Surfactant: 2 L/1000 L of spray solution.

   Water volume: 22 L/ac (minimum).

   Pressure: 275 kPa.

   Nozzles: Flat fan type. Use 50 mesh of larger screens. Use only metal or nylon filters.

   Sprayer clean-up: To avoid injury to susceptible crops, clean sprayer thoroughly immediately after spraying. Ammonia must be used to deactivate Refine Extra when cleaning.

   1. Drain and flush tank, boom and hoses with clean water for a minimum of 10 minutes. Visually inspect tank to ensure removal of all visible residues of Refine Extra. If necessary, repeat step 1.
   2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, and then add more water and ammonia to completely fill tank so that all surfaces are in contact with the solution. Allow to sit for 15 minutes **with agitation**. Again, flush the hoses, boom and nozzles with the cleaning solution and drain tank.
   3. Nozzles and screens should be removed and cleaned seperately in a bucket containing cleaning agent and water.
   4. Repeat step 2.
   5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Refine Extra may be reduced if it remains in the tank for more than 24 hours. Use Assert tank mixes within 12 hours.

9. **How it Works:** Absorbed through foliage. Inhibits cell elongation.

10. **Expected Results:**

    Weeds: Growth stops immediately. Discoloration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed species. **Poor results may be expected if** there is improper mixing, timing, coverage or when weeds are under drought stress.

11. **Effects of Rainfall:** Rainfall within 4 hours of application may lessen degree of weed control.

12. **Movement in Soil:** Refine Extra moves little in the soil and disappears from the soil quickly.

13. **Grazing and Cropping Restrictions:** Barley, wheat and oats may be grazed or fed to livestock 7 days after application of Refine Extra. Do not plant to any crop until 2 months after application. Do not exceed a total of 8 g/ac per crop year. Do not apply Refine Extra plus Accord tank mix or Refine Extra plus Accord plus Avenge 200-C tank mix more than once every 2 years. Do not graze the treated crop or cut for hay within 77 days of application of these mixes.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) is greater than 5,000.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in a cool, dry place.

17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Odyssey, Pursuit, Unity, Refine Extra, the DF component of Laser DF and the Plus component of Champion Plus and Triumph Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Odyssey, Pursuit, Unity, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Reglone/Reglone Pro *(diquat)*

Group 22

Manufacturer: Zeneca Agro

CAUTION POISON

1. **Formulations:** Liquid; 200 g/L; 10 L jug, 110 L.
2. **Registered Mixes:** None.

   Surfactant: Agral 90, Agsurf.
3. **Crops:**

   alfalfa
   beans (adzuki, kidney, red, white)
   canola*
   clover (red, white)
   flax
   lentils
   mustard
   oats
   peas (dry, field)
   potatoes
   soybeans
   sunflowers, all
   trefoil, bird's-foot

   * Argentine canola varieties: should only be used to facilitate harvest of lodged crops. Losses can occur due to pod drop and pod shatter from handling and if unfavourable weather conditions occur.

   Reglone Pro is not approved for aquatic weed control. Reglone Pro contains surfactants which make it unsuitable for this use. Only use Reglone A for aquatic weed control.
4. **Weeds Controlled:** Non-selective for green vegetation, used for weed control and crop desiccation for harvest.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** For crop desiccation.

Alfalfa, trefoil, clover (for seed)	prior to seed harvest. To prevent seed pods from shattering and subsequent loss of seed, interval between spraying and harvest should not exceed 7 days.
Beans, soybeans	coincide application with 80 - 90% natural leaf defoliation.
Canola	when the crop is at the 60 - 70% seed turn (green to brown) stage.
Flaxseed	when the crop is at the 75% boll turn stage (normal swathing time).
Lentils	when swathing would normally commence, lowermost pods are yellow-brown and rattle.
Mustard	when the crop is at the 75% seed turn (green to brown) stage.
Peas	when the crop has reached maturity.
Potato vines	at least 2 weeks before harvest.
Sunflowers	when the seeds reach maturity (20 - 50% moisture in the seed and hull).

17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Odyssey, Pursuit, Unity, Refine Extra, the DF component of Laser DF and the Plus component of Champion Plus and Triumph Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Odyssey, Pursuit, Unity, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Reglone/Reglone Pro *(diquat)*

Group 22

Manufacturer: **Zeneca Agro**

CAUTION POISON

1. **Formulations:** Liquid; 200 g/L; 10 L jug, 110 L.
2. **Registered Mixes:** None.

   Surfactant: Agral 90, Agsurf.
3. **Crops:**

   alfalfa
   beans (adzuki, kidney, red, white)
   canola*
   clover (red, white)
   flax
   lentils
   mustard
   oats
   peas (dry, field)
   potatoes
   soybeans
   sunflowers, all
   trefoil, bird's-foot

   * Argentine canola varieties: should only be used to facilitate harvest of lodged crops. Losses can occur due to pod drop and pod shatter from handling and if unfavourable weather conditions occur.

   Reglone Pro is not approved for aquatic weed control. Reglone Pro contains surfactants which make it unsuitable for this use. Only use Reglone A for aquatic weed control.
4. **Weeds Controlled:** Non-selective for green vegetation, used for weed control and crop desiccation for harvest.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** For crop desiccation.

Alfalfa, trefoil, clover (for seed)	prior to seed harvest. To prevent seed pods from shattering and subsequent loss of seed, interval between spraying and harvest should not exceed 7 days.
Beans, soybeans	coincide application with 80 - 90% natural leaf defoliation.
Canola	when the crop is at the 60 - 70% seed turn (green to brown) stage.
Flaxseed	when the crop is at the 75% ball turn stage (normal swathing time).
Lentils	when swathing would normally commence, lowermost pods are yellow-brown and rattle.
Mustard	when the crop is at the 75% seed turn (green to brown) stage.
Peas	when the crop has reached maturity.
Potato vines	at least 2 weeks before harvest.
Sunflowers	when the seeds reach maturity (20 - 50% moisture in the seed and hull).

Reglone/Reglone Pro (cont'd)

7. How to Apply:

With: Aircraft or ground equipment. Booms on ground equipment must be high enough to ensure proper coverage of foliage.

Rate:

Reglone: Add Agral 90 at 1 L/1,000 L spray mixture; **not** on oats.

Reglone Pro: No adjuvant required.

Crop	Ground Application		Aerial Application	
	Rate L/ac	**Water volume L/ac**	**Rate L/ac**	**Water volume L/ac**
Alfalfa, trefoil, clover (for seed)	0.8-1.3*	90-220	NR	NR
Beans, soybeans (normal crop)	0.8*	90-220	0.8*	18
Beans, soybeans (dense crop)	0.8*	90-220	1.1*	18
Canola, flaxseed, lentils, mustard, peas, sunflowers (normal crop, no weeds)	0.8*	90-220	0.8*	18
Canola, flaxseed, lentils, mustard, peas, sunflowers (dense crop, weedy)	0.8*	90-220	0.8-1.1*	18
Oats: corn spurry control, up to 8 cm tall	0.45	90-135	NR	NR
Oats: corn spurry control, over 8 cm tall	0.6	90-135	NR	NR
Potatoes (top growth fully mature, top growth light and weedy)	0.8*	220-445	0.8*	18
Potatoes (light stands, little weed growth)	0.8-1.1	220-445	0.8-1.1*	18
Potatoes (heavy stands or weedy fields)	1.7	220-445	0.8-1.1*	18

Note: Add Agral 90 or Agsurf at the rate of 1L/1000L of spray solution

Water volume: Aircraft: 18 L/ac. Ground: 100 - 400 L/ac. Higher volumes for best results.

Alfalfa, canola, clover, trefoil, beans, soybeans, flax, mustard, peas, sunflowers: 90 - 180 L/ac.

Oats: 90 - 135 L/ac.

Pressure: 275 - 400 kPa.

Nozzles: Aircraft flat fan type or hollow cone type (D8, D10 or D12 disc with 46 or 56 swirl plate). For ground application, flat fan.

8. Application Tips:

Muddy water will reduce effectiveness. Applications made on cloudy days or just prior to or during periods of darkness will increase effectiveness. Polish varieties may be straight combined. Mature weeds may require higher application rates to increase effectiveness.

9. How it Works:

Reglone is a contact type herbicide; therefore, thorough spray coverage is essential. Absorbed by all leaf and stem surfaces, non-systemic. Interferes with photosynthesis.

Warning: During adverse weather (heavy rain, hail or strong winds), the resultant damage to crops may be enhanced.

10. Expected Results:

Weeds: Fast and virtually complete top kill of annual weeds. Yellowing starts within a few hours of application. Desiccation of the plant will continue rapidly till death.

Crops: Leaf kill will occur within a few days of application. Stem dry-down will take longer depending on the crop; however, harvesting should normally commence within 7 - 14 days. Crop losses can occur due to pod drop and pod shatter from handling and if unfavourable weather conditions occur.

11. Effects of Rainfall:

No effect once the spray solution has dried.

12. Movement in Soil:

Binds to the soil and becomes biologically unavailable. No residual effect.

Reglone/Reglone Pro (cont'd)

7. **How to Apply:**

With: Aircraft or ground equipment. Booms on ground equipment must be high enough to ensure proper coverage of foliage.

Rate:

Reglone: Add Agral 90 at 1 L/1,000 L spray mixture; **not** on oats.

Reglone Pro: No adjuvant required.

[illegible]	[illegible]		[illegible]	
	Rate L/ac	Water volume L/ac	Rate L/ac	Water volume L/ac
Alfalfa, trefoil, clover (for seed)	0.8-1.3*	90-220	NR	NR
Beans, soybeans (normal crop)	0.8*	90-220	0.8*	18
Beans, soybeans (dense crop)	0.8*	90-220	1.1*	18
Canola, flaxseed, lentils, mustard, peas, sunflowers (normal crop, no weeds)	0.8*	90-220	0.8*	18
Canola, flaxseed, lentils, mustard, peas, sunflowers (dense crop, weedy)	0.8*	90-220	0.8-1.1*	18
Oats: corn spurry control, up to 8 cm tall	0.45	90-135	NR	NR
Oats: corn spurry control, over 8 cm tall	0.6	90-135	NR	NR
Potatoes (top growth fully mature, top growth light and weedy)	0.8*	220-445	0.8*	18
Potatoes (light stands, little weed growth)	0.8-1.1	220-445	0.8-1.1*	18
Potatoes (heavy stands or weedy fields)	1.7	220-445	0.8-1.1*	18

* **Note:** Add Agral 90 or Agsurf at the rate of 1L/1000L of spray solution

Water volume: Aircraft: 18 L/ac. Ground: 100 - 400 L/ac. Higher volumes for best results.

Alfalfa, canola, clover, trefoil, beans, soybeans, flax, mustard, peas, sunflowers: 90 - 180 L/ac.

Oats: 90 - 135 L/ac.

Pressure: 275 - 400 kPa.

Nozzles: Aircraft flat fan type or hollow cone type (D8, D10 or D12 disc with 46 or 56 swirl plate). For ground application, flat fan.

8. **Application Tips:** Muddy water will reduce effectiveness. Applications made on cloudy days or just prior to or during periods of darkness will increase effectiveness. Polish varieties may be straight combined. Mature weeds may require higher application rates to increase effectiveness.

9. **How it Works:** Reglone is a contact type herbicide; therefore, thorough spray coverage is essential. Absorbed by all leaf and stem surfaces, non-systemic. Interferes with photosynthesis.

Warning: During adverse weather (heavy rain, hail or strong winds), the resultant damage to crops may be enhanced.

10. **Expected Results:**

Weeds: Fast and virtually complete top kill of annual weeds. Yellowing starts within a few hours of application. Desiccation of the plant will continue rapidly till death.

Crops: Leaf kill will occur within a few days of application. Stem dry-down will take longer depending on the crop; however, harvesting should normally commence within 7 - 14 days. Crop losses can occur due to pod drop and pod shatter from handling and if unfavourable weather conditions occur.

11. **Effects of Rainfall:** No effect once the spray solution has dried.

12. **Movement in Soil:** Binds to the soil and becomes biologically unavailable. No residual effect.

13. **Grazing and Cropping Restrictions:** Crop waste remaining after harvest (e.g., pea and lentil vines, alfalfa stems, etc.) may be used as a feed supplement for livestock. Prevent drift onto crops, ornamental plants, lawns, shelterbelts, grazing areas, wildlife cover, wetlands and other desirable growth.
14. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (230). **Potential to cause eye damage, if eyes are constantly exposed.** May cause oral and nasal irritation shortly after use. Does not cause lung damage. May cause burns upon contact with skin and eyes. Intake can cause kidney failure and liver damage.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage is necessary. Store in original container, tightly closed in a safe place away from children.

Reglone A *(diquat)*

Group 22

Manufacturer Zeneca Agro

CAUTION POISON

1. **Formulations:** Liquid 200 g/L; 1 L jug; 5 L jug.
2. **Registered Mixes:** None.
3. **Crops:** For control of weeds in still or slow moving water of farm dugouts, farm ponds, farm ditches, lakes and canals.
4. **Weeds Controlled:** Canada waterweed, coontail, duckweed, pondweeds, water milfoil.
5. **Weeds Suppressed:** Algae: Cladophora, Spirogyra, and Pithophora will be temporarily controlled.
6. **When Used:** Apply only after weeds are visible and in an active growth stage; which is normally sometime in late May through June as growth is dependent on water temperatures. Application must be made to actively growing weeds before they become so thick that they make application difficult. **Application to dense growth of mature or fully established weeds will not give satisfactory control.**
7. **How to Apply:**

   For floating weeds, use surface application: Dilute one part Reglone A with at least four parts clean water and spray over water surface. Apply from the banks of small bodies of water.

   For submerged weeds, inject below the water surface: A suction type of boat bailer is mounted on the cavitation plate of an outboard motor and the end of the inlet tube inserted into a solution containing one part Reglone A diluted with at least 10 parts of clean water (a backpack sprayer may also be used). Make lines of travel at regular intervals through the water (3 m or less apart) over the area to be treated until the whole area has received a uniform application.

   Rate:
   For areas less than 1.5 m deep: 8.9 L/ac.
   For areas deeper than 1.5 m: 12.1 to 14.2 L/ac.
   Calculating area to be treated: length (m) x width (m) divided by 10,000 m^2 ÷ 2.47 = acres.
   (e.g., 2.25 L of Reglone A will treat a farm dugout 25 m x 50 m with water 1.5 m deep or less.)
8. **Application Tips:** Do not apply to muddy water and do not agitate water excessively during one or two days after treatment as the effectiveness of the chemical will be reduced. Use clean water for diluting the chemical. Do not use wetting agents or surfactants for water treatment. Repeat treatment may be necessary if weed growth reappears. Avoid application or drift onto crops or other desirable growth.

Reglone A (cont'd)

9. **How it Works:** Reglone A is a contact herbicide. Thorough coverage on the weeds is essential to ensure satisfactory control. Interferes with photosynthesis.
10. **Expected Results:** Control of susceptible weeds generally occurs within 1 - 2 weeks.
11. **Effects of Rainfall:** None.
12. **Movement in Soil:** Is absorbed rapidly and becomes biologically inactive and unavailable upon contact with soil, mud or lake bottoms.
13. **Grazing and Cropping Restrictions:** Do not use treated water for at least 24 hours after application for swimming or animal consumption. For human consumption and irrigation do not use for at least 5 days after treatment. In water containing fish, do not treat more than 1/4 to 1/3 of the area at one time, otherwise the dying weeds over a large area will cause a serious loss of oxygen which may result in injury or kill the fish.
14. **Toxicity:** Acute mammalian toxicity. Oral LD_{50} (rats) (mg/kg) = (1389). Potential to cause eye damage, if eyes are constantly exposed. May cause oral and nasal irritation shortly after use. May cause burns upon contact with skin and eyes. Intake can cause kidney failure and liver damage.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store above 0°C. If frozen, warm to room temperature, agitate gently until reconstituted.

Rival *(trifluralin)*

(cereals)

Group 3

Manufacturer **Aventis Crop Science**

1. **Formulations:** Emulsifiable Concentrate; Rival 500 EC; 500 g/L; 9 L, 110 L, 200 L, 400 L containers. Granular; Rival 10G; 10.0%; 22.7 kg bag, 567 kg bags (mini bulk). Water Dispersible Granule; Rival 60 DF, 60%, 7.5 kg bags.
2. **Registered Mixes:**

   Rival 10G: None.

   Rival EC/DF: Avadex BW, Avadex BW + liquid fertilizer, liquid fertilizer.

   Mixing restrictions: Add Rival EC/DF or Rival EC/DF + Avadex directly into the liquid fertilizer, mix thoroughly and apply immediately after mixing. Agitate until application is complete.
3. **Crops:**

   Rival EC/DF: Barley, wheat (durum, spring).

   Rival 10G: Fall application: Barley. Fall and summer fallow application: wheat (durum, spring and semi-dwarf) in soils with 2 - 8% organic matter.

   Underseeding: Not recommended.

4. Weeds Controlled:

Rival EC/DF: Green foxtail.

Rival 10G: Barley. Wheat (fall): foxtail (green and yellow). Wheat (summer fallow crop year): foxtail (green and yellow), lamb's-quarters, suppression of wild oats and wild buckwheat.

5. Weeds Suppressed: See above.

6. When Used:

Rival EC/DF: Alone or with Avadex BW in the spring only after seeding and prior to crop emergence.

Rival 10G: Barley: fall only, September 1 to soil freeze-up. Wheat: fall, September 1 to soil freeze-up for green foxtail only the following year. Wheat summer fallow: May 1 - July 31.

Warning: Do not apply Rival 10G on land treated with trifluralin products since the previous year.

7. How to Apply:

With: Ground equipment.

Rate:

Rival 10G: Barley

[illegible]	[illegible]	[illegible]
Light	2 - 4	3.4
Medium or heavy	4 - 6	4.5
Medium or heavy	6 - 10	5.7

Rival 10G: Wheat: Summer fallow application

[illegible]	[illegible]	[illegible]	[illegible]
1 - 3	3.8 kg/ac	3.2 kg/ac	2.6 kg/ac
4 - 8	4.5 kg/ac	3.8 kg/ac	3.2 kg/ac

Rival EC: 485 mL/ac on light to medium textured soil. 650 mL/ac on heavy textured soil.

Rival DF: 400 gm/ac on light textured soils, 485 gm/ac on medium textured soils, 525 gm/ac on heavy textured soils.

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Mixing instructions:

Rival DF: Fill sprayer 1/3 full of clean water, then add the recommended amount of Rival 60 DF. Continue the filling operation until required volumes are achieved. Vigorous agitation is required before and during application of Rival 60 DF.

Note: Spray out immediately. Spray mixture should not be left in the tank without agitation.

Rival 10G: Wheat (fall application): 2.3 kg/ac.

Incorporation:

Rival EC/DF: Incorporate 2 - 4 cm with 2 cross harrowings with tyne or diamond harrows operated at a minimum of 9 km/h. Both incorporations should be done within 24 hours of application.

Rival 10G: Fall application: incorporate to 8 - 10 cm. The first incorporation within 24 hours and the second delayed for at least 5 days for more effective weed control. A shallow tillage in the spring, prior to seeding, is required. Wheat: summer fallow application: incorporate to 8 cm. The first incorporation within 24 hours and the second delayed 5 days or until new weed regrowth requires a cultivation or discing. Additional shallow (8 cm) tillage operations may be required to control resistant weed growth.

4. Weeds Controlled:

Rival EC/DF: Green foxtail.

Rival 10G: Barley. Wheat (fall): foxtail (green and yellow). Wheat (summer fallow crop year): foxtail (green and yellow), lamb's-quarters, suppression of wild oats and wild buckwheat.

5. Weeds Suppressed: See above.

6. When Used:

Rival EC/DF: Alone or with Avadex BW in the spring only after seeding and prior to crop emergence.

Rival 10G: Barley: fall only, September 1 to soil freeze-up. Wheat: fall, September 1 to soil freeze-up for green foxtail only the following year. Wheat summer fallow: May 1 - July 31.

Warning: Do not apply Rival 10G on land treated with trifluralin products since the previous year.

7. How to Apply:

With: Ground equipment.

Rate:

Rival 10G: Barley

Soil Type	Organic matter (%)	Rate kg/ac
Light	2 - 4	3.4
Medium or heavy	4 - 6	4.5
Medium or heavy	6 - 10	5.7

Rival 10G: Wheat: Summer fallow application

Organic matter (%)	May	June	July
1 - 3	3.8 kg/ac	3.2 kg/ac	2.6 kg/ac
4 - 8	4.5 kg/ac	3.8 kg/ac	3.2 kg/ac

Rival EC: 485 mL/ac on light to medium textured soil. 650 mL/ac on heavy textured soil.

Rival DF: 400 gm/ac on light textured soils. 485 gm/ac on medium textured soils. 525 gm/ac on heavy textured soils.

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Mixing instructions:

Rival DF: Fill sprayer 1/3 full of clean water, then add the recommended amount of Rival 60 DF. Continue the filling operation until required volumes are achieved. Vigorous agitation is required before and during application of Rival 60 DF.

Note: Spray out immediately. Spray mixture should not be left in the tank without agitation.

Rival 10G: Wheat (fall application): 2.3 kg/ac.

Incorporation:

Rival EC/DF: Incorporate 2 - 4 cm with 2 cross harrowings with tyne or diamond harrows operated at a minimum of 9 km/h. Both incorporations should be done within 24 hours of application.

Rival 10G: Fall application: incorporate to 8 - 10 cm. The first incorporation within 24 hours and the second delayed for at least 5 days for more effective weed control. A shallow tillage in the spring, prior to seeding, is required. Wheat: summer fallow application: incorporate to 8 cm. The first incorporation within 24 hours and the second delayed 5 days or until new weed regrowth requires a cultivation or discing. Additional shallow (8 cm) tillage operations may be required to control resistant weed growth.

Rival (cereals) (cont'd)

8. **Application Tips:**

Rival EC/DF: Apply only on trash free or summer fallow fields. Crops must be seeded 5 - 8 cm deep in a well tilled seedbed to prevent contact between the chemical and the seed.

Caution: Crop injury, delayed maturity or reduced yields, may occur if emerging crops are weakened from factors such as improper seeding depth, excessive moisture, cold temperature, seedling disease, poor soil fertility, drought or saline soils.

Rival 10G:

Warning: Do not apply to soils with less than 2% organic matter or more than 10% organic matter. Seeding should be done into a warm, moist seedbed. Avoid seeding in cold soil. In wheat, drought conditions in the fallow year may result in higher than normal carry-over of Rival 10G; increase seeding rate of wheat. Populations of green foxtail tolerant to trifluralin products including Rival have developed in fields in Western Canada. Rival will not control trifluralin-tolerant green foxtail. Herbicide rotation should be practised to avoid the spread of trifluralin-tolerant green foxtail. Avoid repeated use of trifluralin products in the same field.
Cautions: Do not apply to soils subject to erosion.

9. **How it Works:** Acts on both the root and shoot tips as they emerge. Prevents cell division and affected plants die before emergence. If the shoot portion of the plant escapes to the soil surface, lateral or secondary root growth is inhibited, causing a slow death since the plant is unable to gather moisture or nutrients.

10. **Expected Results:**

Green foxtail: Seeds that germinate below the treated layer will produce plants that will emerge. The secondary root system of plants that form within the treated layer is completely inhibited by trifluralin present in that area. The affected plant dies slowly as crop competition and temperature stress over-tax the rootless plant's ability to take up moisture.

Crop: Crop safety is maintained when seeded to a depth of 5 - 8 cm.

11. **Effects of Rainfall:** No effect once incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

Succeeding crops: Under normal conditions, Rival will not carry over. As a precaution, oats, sugar beets, creeping red fescue and small-seeded grasses should not follow a Rival treated crop.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) mg/kg) = (greater than 5,000). In clean water, fish are very sensitive to trifluralin; but in runoff and muddy water, trifluralin binds to the suspended soil particles and large amounts can be tolerated by fish. Non-toxic to bees.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:**

Rival EC: If stored below 0°C, bring the contents to 15°C for 24 hours and shake well before using. Do not store near heat, spark or open flame.

Rival 10G: Do not store under direct sunlight. Do not store in granular applicator (24 hours max.).

Rival DF: Store at cool temperatures. Do not store under direct sunlight.

17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Heritage, Bonanza, Rival and Fortress) will not control trifluralin-tolerant green foxtail. To delay selection or reduce the spread of trifluralin-tolerant green foxtail, avoid the use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin-tolerant green foxtail.

Note: Similar products are Advance 10G, Treflan and Bonanza.

Rival *(trifluralin)*
(oilseeds, special crops)

Group 3

Manufacturer: Aventis Crop Science

1. **Formulations:** Emulsifiable Liquid; Rival 500 EC; 500 g/L; 9 L, 110 L, 200 L, 400 L containers. Granular; Rival 10G; 10.0%; 22.7 kg bag, 567 kg bags (mini bulk). Water Dispersible Granule; Rival 60 DF; 60%, 7.5 kg bag.

2. **Registered Mixes:** Rival 10G: None. Rival EC/DF+liquid nitrogen fertilizer (28-0-0). Rival EC/DF+Sencor for T.T.C.

   Mixing Instructions: Rival EC at recommended rates must be impregnated with a minimum of 81 kg/ac of dry fertilizer. Mix and blend the dry fertilizer and Rival EC in a rotary fertilizer blender. The nozzles used to spray Rival EC on the fertilizer should be situated to provide uniform spray coverage. Allow for sufficient blending time to ensure uniform coverage of the fertilizer with this product. If the fertilizer-herbicide mixture is too wet to allow for uniform application, the use of a highly absorptive material such as diatomaceous earth or finely powdered clay is recommended. Enough absorptive material should be added to ensure a free-flowing mixture.

   Note: Higher rates of fertilizer may be required to ensure that mixture is not too wet especially when using higher rates of Rival EC. Refer to the label for rate charts.

3. **Crops:**

asparagus	lentils* (8.5)	**Transplanted**	canola (including triazine tolerant)
beans, dry common (only	mustard (8.9)	**shelterbelts**	flax (7.7)
black, kidney, snap, white)	peas (field, canning)	ash, green	lentils* (8.5)
broccoli, transplant	peppers	caragana	mustard (8.9)
brussel sprouts, transplant	rutabaga	elm (American, Siberian)	peas (canning, field) (8.9)
cabbage	safflower	pine, Scotch	sunflowers (8.9)
canola (8.9)	sainfoin**		
(including triazine tolerant)	saskatoon berries		
carrots	soybeans (8.9)		
cauliflower	strawberries		
crambe	sunflowers (8.9)		
fababeans (8.6)	sweet clover		
flax (7.7)	tomatoes		
forage rape	turnips (stubble)		

* Fall application only.
** Spring application only.

   Underseeding: Not recommended.

4. **Weeds Controlled:**

annual bluegrass (8.6)
barnyard grass (8.3)
chickweed (7.1)
cow cockle (9.0)
downy bromegrass (5.9)
green foxtail
knotweed
lamb's-quarters (8.0)
Persian darnel
pigweed (8.2)
purslane (7.9)
Russian thistle (7.9)
wild buckwheat (8.3)
wild oats (7.5)
yellow foxtail (8.1)

5. **Weeds Suppressed:** None.

Rival *(trifluralin)*
(oilseeds, special crops)

Group 3

Manufacturer: **Aventis Crop Science**

1. **Formulations:** Emulsifiable Liquid; Rival 500 EC; 500 g/L; 9 L, 110 L, 200 L, 400 L containers. Granular: Rival 10G; 10.0%; 22.7 kg bag, 567 kg bags (mini bulk). Water Dispersible Granule; Rival 60 DF; 60%, 7.5 kg bag.
2. **Registered Mixes:** Rival 10G: None. Rival EC/DF + liquid nitrogen fertilizer (28-0-0). Rival EC/DF + Sencor for T.T.C.

   Mixing instructions: Rival EC at recommended rates must be impregnated with a minimum of 81 kg/ac of dry fertilizer. Mix and blend the dry fertilizer and Rival EC in a rotary fertilizer blender. The nozzles used to spray Rival EC on the fertilizer should be situated to provide uniform spray coverage. Allow for sufficient blending time to ensure uniform coverage of the fertilizer with this product. If the fertilizer-herbicide mixture is too wet to allow for uniform application, the use of a highly absorptive material such as diatomaceous earth or finely powdered clay is recommended. Enough absorptive material should be added to ensure a free-flowing mixture.

   Note: Higher rates of fertilizer may be required to ensure that mixture is not too wet especially when using higher rates of Rival EC. Refer to the label for rate charts.
3. **Crops:**

Rival EC/Rival DF

asparagus
beans, dry common (only black, kidney, snap, white)
broccoli, transplant
brussel sprouts, transplant
cabbage
canola (8.9) (including triazine tolerant)
carrots
cauliflower
crambe
fababeans (8.6)
flax (7.7)
forage rape
lentils* (8.5)
mustard (8.9)
peas (field, canning)
peppers
rutabaga
safflower
sainfoin**
saskatoon berries
soybeans (8.9)
strawberries
sunflowers (8.9)
sweet clover
tomatoes
turnips (stubble)

Transplanted shelterbelts

ash, green
caragana
elm (American, Siberian)
pine, Scotch

Rival 10G

canola (including triazine tolerant)
flax (7.7)
lentils* (8.5)
mustard (8.9)
peas (canning, field) (8.9)
sunflowers (8.9)

* Fall application only.
** Spring application only.

Underseeding: Not recommended.

4. **Weeds Controlled:**

annual bluegrass (8.6)
barnyard grass (8.3)
chickweed (7.1)
cow cockle (9.0)
downy bromegrass (5.9)
green foxtail
knotweed
lamb's-quarters (8.0)
Persian darnel
pigweed (8.2)
purslane (7.9)
Russian thistle (7.9)
wild buckwheat (8.3)
wild oats (7.5)
yellow foxtail (8.1)

5. **Weeds Suppressed:** None.

Rival (oilseeds, special crops) (cont'd)

6. When Used:

Rival EC/Rival DF:

Spring: Beans, broccoli (transplant), brussel sprouts (transplant), cabbage, canola, carrots, cauliflower, crambe, fababeans, forage rape, mustard, peas, peppers, safflower, sainfoin, saskatoon berries, shelterbelts, soybeans, sunflowers, sweet clover, tomatoes, turnips (stubble). Cultivate to destroy existing weeds and apply pre-plant. Shelterbelts: apply before transplanting.

Summer: Canola, flax, safflower. On summer fallow between June 1 and September 1.

Fall: Beans (black only), canola, flax, lentils, mustard, peas (field), safflower, sunflowers. September 1 to soil freeze-up.

Rival application is discouraged where soil drifting is a problem.

Rival 10G:

Spring: Not recommended in Alberta.

Summer: Canola, flax. Between June 1 and September 1.

Fall: Canola, flax, lentils, mustard, peas, sunflowers. Between September 1 and soil freeze-up.

Note: For fall applications where erosion may be a problem, maximize crop residue cover with only one fall tillage incorporation.

7. How to Apply:

With: Ground equipment.

Rate: Rival 500 EC will be applied at the same rates as currently listed for spring treatments, with the exception of cauliflower, cabbage and turnips (stubble) which are applied at 650 mL/ac in 2 - 6% OM and 1.38 L/ac in 6 - 15% OM.

[redacted]

Spring*	650 mL	NR	890 mL	NR	890 mL	NR	0.89 - 1.13 L	NR
Fall*	890 mL	4.5	1.13 L	5.7	1.13 L	5.7	1.13 - 1.3 L	5.7 - 6.9
Summer (flax, canola)	1.38 L	6.9	1.38 L	6.9	1.38 L	6.9	1.38 L	6.9
Shelterbelts	1.8 L	NR	3.6 L	NR	3.6 L	NR	3.6 L	NR
Strawberries	890 mL	NR	890 mL	NR	890 mL	NR	890 mL	NR
Asparagus	810 mL	NR	810 mL	NR	1.2 L	NR	1.6 L	NR
Flax, lentils (fall)	890 mL	4.5	1.13 L	5.7	890 mL	4.5	1.13 - 1.8 L	5.7 - 6.9

* All crops except lentils and flax.
NR – Not Recommended.

Rival DF

Spring*	525	725	725	725 - 930
Fall*	725	930	930	930 - 1135
Summer (flax, canola	1135	1135	1135	1135
Shelterbelts	1500	2955	2955	2955
Strawberries	525	725	725	725
Asparagus	690	690	1012	1335
Flax, lentils (fall)	725	930	725	930 - 1135

* All crops except lentils and flax.

Water volume: 40 L/ac.

Pressure: 200 - 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: First incorporation in the same direction as application, within 24 hours of application. Second at right angles to the first.

Rival 10G: For maximum effectiveness, delay the second incorporation for 5 days.

Flax, lentils: Both incorporations should be done prior to soil freeze-up in the fall. A tandem disc, discer or field (vibrashank) cultivator are recommended for incorporating to 8 - 10 cm. For best mixing action, operate disc implements at 6 - 10 km/h; cultivators at 10 - 13 km/h. Deep tillage cultivators are not recommended.

Mixing instructions:

Rival 60 DF: Fill sprayer 1/3 full of clean water, then add the recommended amount of Rival 60 DF. Continue the filling operation until required volumes are achieved. Vigorous agitation is required before and during application of Rival 60 DF.

Note: Spray out immediately. Spray mixture should not be left in the tank without agitation.

Rival (oilseeds, special crops) (cont'd)

6. When Used:

Rival EC/Rival DF:

Spring: Beans, broccoli (transplant), brussel sprouts (transplant), cabbage, canola, carrots, cauliflower, crambe, fababeans, forage rape, mustard, peas, peppers, safflower, sainfoin, saskatoon berries, shelterbelts, soybeans, sunflowers, sweet clover, tomatoes, turnips (stubble). Cultivate to destroy existing weeds and apply pre-plant. Shelterbelts: apply before transplanting.

Summer: Canola, flax, safflower. On summer fallow between June 1 and September 1.

Fall: Beans (black only), canola, flax, lentils, mustard, peas (field), safflower, sunflowers. September 1 to soil freeze-up.

Rival application is discouraged where soil drifting is a problem.

Rival 10G:

Spring: Not recommended in Alberta.

Summer: Canola, flax. Between June 1 and September 1.

Fall: Canola, flax, lentils, mustard, peas, sunflowers. Between September 1 and soil freeze-up.

Note: For fall applications where erosion may be a problem, maximize crop residue cover with only one fall tillage incorporation.

7. How to Apply:

With: Ground equipment.

Rate: Rival 500 EC will be applied at the same rates as currently listed for spring treatments, with the exception of cauliflower, cabbage and turnips (stubble) which are applied at 650 mL/ac in 2 - 6% OM and 1.38 L/ac in 6 - 15% OM.

	Sandy soils organic matter				Loams to clay soils organic matter			
	2 - 6%		6 - 15%		2 - 6%		6 - 15%	
Crop/Season	Rival 500 EC/ac	Rival 10G kg/ac	Rival 500 EC/ac	Rival 10G kg/ac	Rival 500 EC/ac	Rival 10G kg/ac	Rival 500 EC/ac	Rival 10G kg/ac
Spring*	650 mL	NR	890 mL	NR	890 mL	NR	0.89 - 1.13 L	NR
Fall*	890 mL	4.5	1.13 L	5.7	1.13 L	5.7	1.13 - 1.3 L	5.7 - 6.9
Summer (flax, canola)	1.38 L	6.9	1.38 L	6.9	1.38 L	6.9	1.38 L	6.9
Shelterbelts	1.8 L	NR	3.6 L	NR	3.6 L	NR	3.6 L	NR
Strawberries	890 mL	NR	890 mL	NR	890 mL	NR	890 mL	NR
Asparagus	810 mL	NR	810 mL	NR	1.2 L	NR	1.6 L	NR
Flax, lentils (fall)	890 mL	4.5	1.13 L	5.7	890 mL	4.5	1.13 - 1.8 L	5.7 - 6.9

* All crops except lentils and flax.

NR – Not Recommended.

Rival DF

	Sandy soils organic matter		Medium or heavy soils organic matter	
	2 - 6%	6 - 15%	2 - 6%	6 - 15%
Crop/Season	Rival 60 DF g/ac	Rival 60 DF g/ac	Rival 60 DF g/ac	Rival 60 DF g/ac
Spring*	525	725	725	725 - 930
Fall*	725	930	930	930 - 1135
Summer (flax, canola	1135	1135	1135	1135
Shelterbelts	1500	2955	2955	2955
Strawberries	525	725	725	725
Asparagus	690	690	1012	1335
Flax, lentils (fall)	725	930	725	930 - 1135

* All crops except lentils and flax.

Water volume: 40 L/ac.

Pressure: 200 - 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: First incorporation in the same direction as application, within 24 hours of application. Second at right angles to the first.

Rival 10G: For maximum effectiveness, delay the second incorporation for 5 days.

Flax, lentils: Both incorporations should be done prior to soil freeze-up in the fall. A tandem disc, discer or field (vibrashank) cultivator are recommended for incorporating to 8 - 10 cm. For best mixing action, operate disc implements at 6 - 10 km/h; cultivators at 10 - 13 km/h. Deep tillage cultivators are not recommended.

Mixing instructions:

Rival 60 DF: Fill sprayer 1/3 full of clean water, then add the recommended amount of Rival 60 DF. Continue the filling operation until required volumes are achieved. Vigorous agitation is required before and during application of Rival 60 DF.

Note: Spray out immediately. Spray mixture should not be left in the tank without agitation.

Rival (oilseeds, special crops) (cont'd)

Rival Plus Sencor tank mix in triazine tolerant canola

	Sandy soils organic matter		Loams to clay soils organic matter			
	2 - 3%	3 - 6%	2 - 3%	3 - 6%	6 - 10%	10 - 15%
Rival 500 EC (mL/ac spring)	650	650	890	890	890 - 1135	890 - 1135
Rival 500 EC (mL/ac fall)	890	890	1135	1135	1135 - 1375	1135 - 1375
Rival 60 DF (g/ac spring)	525	525	725	725	725 - 930	725 - 930
Rival 60 DF (g/ac fall)	725	725	930	930	930 - 1135	930 - 1135
Sencor 500 F (spring/mL/ac)	170	225	170	225	225 - 345	345
Sencor 500 F (fall/mL/ac)	225	285	225	285	285 - 345	345
Sencor DF (spring/g/ac)	110	150	110	150	150 - 225	225
Sencor DF (fall/g/ac)	110	150	110	150	150 - 225	225
	150	190	150	190	190 - 225	225

8. **Application Tips:** Do not apply on soils that are wet or subject to flooding, in poor tilth or contain more than 15% organic matter. A tandem disc mixes best on stubble or crusted, lumpy or wet soil. To avoid concentrating wild oat seeds below the treated layer, do not plow land prior to trifluralin application. Fall or summer application should be followed by a light spring tillage to a 5 - 8 cm depth before seeding.

   Rival EC/DF: Use on soils with less than 20 - 25% straw cover. On stubble, chop and thoroughly mix residues and weed growth into the soil, to a depth of 10 - 15 cm, before application.

   Flax, lentils: To ensure a firm seedbed and maintain a constant depth of planting, a shallow tillage in the spring is recommended. Seed into a warm (usually after mid May), moist, firm seedbed to a depth of 2 - 4 cm. Populations of green foxtail tolerant to trifluralin products including Rival have developed in fields in Western Canada. Rival will not control trifluralin-tolerant green foxtail. Herbicide rotation should be practised to avoid the spread of trifluralin-tolerant green foxtail. Avoid repeated use of trifluralin products in the same field.

9. **How it Works:** Kills seedlings as they germinate. Inhibits cell division in the actively growing points of root and shoot.

10. **Expected Results:**

    Weeds: Most weeds die before emerging. Weeds will exhibit swelling in the coleoptile region, stubby, thick primary root development and lack of secondary roots, which leads to death due to inadequate moisture obtaining ability.

    Crop: Seed flax into a well packed warm, moist seedbed. Do not seed deeper than 4 cm.

11. **Effects of Rainfall:** No effect once trifluralin is incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** None.

    Crop use after hail: No restrictions.

    Succeeding crops: Normally, trifluralin carry-over will not harm crops grown in rotation. As a precaution, oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not follow a trifluralin treated crop. Alfalfa and most clovers are tolerant to trifluralin. Drought conditions in the year of treatment may result in higher levels of trifluralin carry-over into the next year. To avoid wheat injury, seed less than 7 cm deep into a warm, moist seedbed.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000). In clean water, fish are very sensitive to trifluralin, but in runoff or muddy water, it binds to soil particles and large amounts can be tolerated by fish. Non-toxic to bees. Intake can cause heart, liver and kidney damage. A small amount of vomited liquid inhaled can be fatal.

15. **Precautions, First Aid:** Rival EC is highly flammable. May explode if heated. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:**

    Rivel EC: If stored below 0 C, bring the contents to 15 C for 24 hours and shake well before using. Do not store near heat, spark or open flame.

    Rival 10G: Do not store under direct sunlight. Do not store in granular application (24 hours maximum).

    Rival DF: Store at cool temperatures. Do not store under direct sunlight.

    Note: Similar products are Treflan, Bonanza.

17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Heritage, Bonanza, Rival and Fortress) will not control trifluralin-tolerant green foxtail. To delay selection or reduce the spread of trifluralin-tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin-tolerant green foxtail.

Ro-neet *(cycloate)*

Manufacturer: **Zeneca Agro**

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate: 720 g/L: 20 L containers.
2. **Registered Mixes:** Nortron, Avadex BW, liquid and dry fertilizer.
3. **Crops:** Sugar beets, red beets and spinach.
4. **Weeds Controlled:**

Annual grasses	Annual broadleaf weeds
barnyard grass	black nightshade
crab grass	hairy nightshade
green foxtail	henbit
wild oats	lamb's-quarters
yellow foxtail	purslane
	redroot pigweed

5. **Weeds Suppressed:** None.
6. **When Used:** May be applied in the fall before the ground freezes or in the spring pre-plant soil incorporated. May be applied in mixture with Nortron during fall ridging.

Rival (oilseeds, special crops) (cont'd)

Rival Plus Sencor tank mix in triazine tolerant canola

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rival 500 EC (mL/ac spring)	650	650	890	890	890 - 1135	890 - 1135
Rival 500 EC (mL/ac fall)	890	890	1135	1135	1135 - 1375	1135 - 1375
Rival 60 DF (g/ac spring)	525	525	725	725	725 - 930	725 - 930
Rival 60 DF (g/ac fall)	725	725	930	930	930 - 1135	930 - 1135
Sencor 500 F (spring/mL/ac)	170	225	170	225	225 - 345	345
Sencor 500 F (fall/mL/ac)	225	285	225	285	285 - 345	345
Sencor DF (spring/g/ac)	110	150	110	150	150 - 225	225
Sencor DF (fall/g/ac)	110 150	150 190	110 150	150 190	150 - 225 190 - 225	225 225

8. **Application Tips:** Do not apply on soils that are wet or subject to flooding, in poor tilth or contain more than 15% organic matter. A tandem disc mixes best on stubble or crusted, lumpy or wet soil. To avoid concentrating wild oat seeds below the treated layer, do not plow land prior to trifluralin application. Fall or summer application should be followed by a light spring tillage to a 5 - 8 cm depth before seeding.

   Rival EC/DF: Use on soils with less than 20 - 25% straw cover. On stubble, chop and thoroughly mix residues and weed growth into the soil, to a depth of 10 - 15 cm, before application.

   Flax, lentils: To ensure a firm seedbed and maintain a constant depth of planting, a shallow tillage in the spring is recommended. Seed into a warm (usually after mid May), moist, firm seedbed to a depth of 2 - 4 cm. Populations of green foxtail tolerant to trifluralin products including Rival have developed in fields in Western Canada. Rival will not control trifluralin-tolerant green foxtail. Herbicide rotation should be practised to avoid the spread of trifluralin-tolerant green foxtail. Avoid repeated use of trifluralin products in the same field.

9. **How it Works:** Kills seedlings as they germinate. Inhibits cell division in the actively growing points of root and shoot.

10. **Expected Results:**

    Weeds: Most weeds die before emerging. Weeds will exhibit swelling in the coleoptile region, stubby, thick primary root development and lack of secondary roots, which leads to death due to inadequate moisture obtaining ability.

    Crop: Seed flax into a well packed warm, moist seedbed. Do not seed deeper than 4 cm.

11. **Effects of Rainfall:** No effect once trifluralin is incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** None.

    Crop use after hail: No restrictions.

    Succeeding crops: Normally, trifluralin carry-over will not harm crops grown in rotation. As a precaution, oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not follow a trifluralin treated crop. Alfalfa and most clovers are tolerant to trifluralin. Drought conditions in the year of treatment may result in higher levels of trifluralin carry-over into the next year. To avoid wheat injury, seed less than 7 cm deep into a warm, moist seedbed.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 5,000). In clean water, fish are very sensitive to trifluralin, but in runoff or muddy water, it binds to soil particles and large amounts can be tolerated by fish. Non-toxic to bees. Intake can cause heart, liver and kidney damage. A small amount of vomited liquid inhaled can be fatal.
15. **Precautions, First Aid:** Rival EC is highly flammable. May explode if heated. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:**

    Rivel EC: If stored below 0°C, bring the contents to 15°C for 24 hours and shake well before using. Do not store near heat, spark or open flame.

    Rival 10G: Do not store under direct sunlight. Do not store in granular application (24 hours maximum).

    Rival DF: Store at cool temperatures. Do not store under direct sunlight.

    Note: Similar products are Treflan, Bonanza.
17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Heritage, Bonanza, Rival and Fortress) will not control trifluralin-tolerant green foxtail. To delay selection or reduce the spread of trifluralin-tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin-tolerant green foxtail.

Ro-neet *(cycloate)*

Manufacturer: **Zeneca Agro**

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; 720 g/L; 20 L containers.
2. **Registered Mixes:** Nortron, Avadex BW, liquid and dry fertilizer.
3. **Crops:** Sugar beets, red beets and spinach.
4. **Weeds Controlled:**

barnyard grass	black nightshade
crab grass	hairy nightshade
green foxtail	henbit
wild oats	lamb's-quarters
yellow foxtail	purslane
	redroot pigweed

5. **Weeds Suppressed:** None.
6. **When Used:** May be applied in the fall before the ground freezes or in the spring pre-plant soil incorporated. May be applied in mixture with Nortron during fall ridging.

Ro-neet (cont'd)

7. **How to Apply**:

With: Ground equipment with liquid fertilizer impregnated on dry fertilizer or equipment designed for application of granular herbicides. To prevent chemical loss, incorporate immediately into the soil (see *Incorporation* section below).

Rate: Sugar Beets: 2.5 - 3.1 L/ac on mineral soils only. Use lower rate on light sandy soils and the higher rate on heaviers soils.

Water volume: 80 - 160 L/ac.

Pressure: 150 - 350 kPa.

Nozzles: All standard and low pressure nozzles. Do not use single nozzle boom-jet type sprayers.

Incorporation: Incorporation must be thorough for good weed control and should be carried out immediately (within minutes) after application. Fall layering in conjunction with fall ridging may be carried out. Under most conditions, the treated area should be firmly rolled between the incorporation unit and the planter. Several types of implements can provide satisfactory incorporation, such as:

For broadcast (overall) applications:
1. Hooded power-driven rotary tiller: teeth set close enough to uniformly mix to a depth of 5 - 7.5 cm.
2. Tandem or offset discs at 10 - 15 cm depth. On heavy and medium soils, cross (disc twice at right angles). On light soil, disc once followed by harrowing for additional mixing and to level the seed bed.

For band (row application): Uniformly mix to a depth of 5 - 7.5 cm.
1. Hooded power-driven rotary tiller.
2. Hooded ground-driven rotary tiller.

Ground speed: 9 km/h.

8. **Application Tips:** Use high volume, low pressure nozzles to ensure maximum uniform coverage. Incorporate immediately after application.

9. **How it Works:** Uptake by seed, roots and hypocotyl with upward translocation to the growing tip of germinating weeds. It disrupts and stops further growth, which kills the germinating weed. Species differentiation is due to enzymatic detoxification and seed food reserves permitting the seedling to outgrow the chemical effects.

10. **Expected Results**:

Weeds: Ro-Neet is absorbed by the germinating weed seed; thus, most affected weeds will not emerge. Numerous chlorotic shoots may be visible by removing the top few cm of treated soil. Weeds will be controlled before they can compete for moisture and nutrients essential to the crop. Control will be for most of the growing season.

Crop: Under unfavourable germination conditions, leaf crinkling or leaf sealing may be observed but usually without adverse effects on crop yield.

11. **Effects of Rainfall:** Ro-Neet is water soluble, however, will not leach significantly under heavy rainfall.

12. **Movement in Soil:** Ro-Neet is quite resistant to leaching in heavy clay soils and in high organic soils. In loamy sand, it may leach from the surface, downward several inches, with heavy precipitation.

13. **Grazing and Cropping Restrictions**:

Drift: Danger from drift is low.

14. **Toxicity**. Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (3,160). No short term or long term human health effects have been associated with this product. Very toxic to fish. Non-toxic to birds.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Protect from temperatures below -6°C. Product crystallizes at lower temperatures. Do not use or store near heat or flame.

Roundup Fast Forward

(glyphosate + glufosinate ammonium)

Group 9,10

Manufacturer **Monsanto Canada Inc**

1. **Formulations:** Water soluble liquid; 300 g/L acid equivalent glyphosate (present as 400 g/L isopropylamine salt) + 16 g/L glufosinate ammonium; 10 L, 115 L, 750 L containers.
2. **Registered Mixes:** None.
3. **Crops:** Wheat, canola, flax (excluding low linolenic acid varieties), peas, lentils and dry beans. Do not apply to crops if grown for seed production.
4. **Weeds Controlled:** Canada thistle (7.6) and quackgrass (7.6).
5. **Weeds Suppressed:** None.
6. **When Used:**

   Canada thistle: At or beyond bud stage of growth.

   Quackgrass: Should have at least 4 - 5 green leaves and be actively growing.

Guidelines For Timing Of Preharvest Applications

Crop(s)	Percent Grain Moisture	Visual Symptoms
Wheat	Less than 30	Hard dough stage; a thumbnail impression remains on seed.
Canola	Less than 30	Pods are green to yellow; most seeds are yellow to brown.
Flax (excluding low linolenic acid varieties)	Less than 30	Majority (75 - 80%) of bolls are brown.
Peas	Less than 30	Majority (75 - 80%) of pods are brown.
Lentils	Less than 30	Lowermost pods (bottom 15%) are brown and seeds rattle.
Dry beans	Less than 30	Stems are green to brown; pods are mature (yellow to brown); 80 - 90% leaf drop (original leaves).

7. **How to Apply:** Do not use galvanized steel or unlined steel tanks, as a combustible gas may be formed.

   With: Ground equipment only. Do not apply by air.

   Rate: 1.2 L/ac.

   Water volume: 45 L/ac. Always use clean water, free of sediments.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

   Incorporation: Not applicable.

Roundup Fast Forward

(glyphosate + glufosinate ammonium)

Group 9,10

Manufacturer: **Monsanto Canada Inc.**

1. **Formulations:** Water soluble liquid; 300 g/L acid equivalent glyphosate (present as 400 g/L isopropylamine salt) + 16 g/L glufosinate ammonium; 10 L, 115 L, 750 L containers.
2. **Registered Mixes:** None.
3. **Crops:** Wheat, canola, flax (excluding low linolenic acid varieties), peas, lentils and dry beans. Do not apply to crops if grown for seed production.
4. **Weeds Controlled:** Canada thistle (7.6) and quackgrass (7.6).
5. **Weeds Suppressed:** None.
6. **When Used:**

   Canada thistle: At or beyond bud stage of growth.

   Quackgrass: Should have at least 4 - 5 green leaves and be actively growing.

Guidelines For Timing Of Preharvest Applications

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Peas	Less than 30	Majority (75 - 80%) of pods are brown.
Lentils	Less than 30	Lowermost pods (bottom 15%) are brown and seeds rattle.
Dry beans	Less than 30	Stems are green to brown; pods are mature (yellow to brown); 80 - 90% leaf drop (original leaves).

7. **How to Apply:** Do not use galvanized steel or unlined steel tanks, as a combustible gas may be formed.

   With: Ground equipment only. Do not apply by air.

   Rate: 1.2 L/ac.

   Water volume: 45 L/ac. Always use clean water, free of sediments.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

   Incorporation: Not applicable.

Roundup Fast Forward (cont'd)

8. **Application Tips:** To ensure best weed control and to maximize harvest management benefits, apply only when the crop has 30% or less grain moisture content. This stage typically occurs 7 - 14 days before harvest. Consult the table *Guidelines for Timing of Preharvest Applications* for visual indicators of this stage in each crop. Earlier application may reduce crop yield and/or quality and may lead to excess glyphosate residues in the crop. Do not treat weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result. Reduced results may also occur when treating weeds heavily covered with dust.
9. **How it Works:** Glyphosate is a non-selective, systemic herbicide that moves from treated foliage into the root system, killing the entire plant. Glufosinate ammonium is primarily a contact herbicide that is absorbed by leaf and stem surfaces. Glufosinate interferes with the plants ability to detoxify ammonia.
10. **Expected Results:** Visual effects on most annual weeds occur within 2 - 4 days and on most perennial weeds in 5 - 7 days. Visible effects are a gradual wilting and yellowing of the plant, which advances to complete browning of above ground growth and deterioration of underground plant parts. This herbicide will provide harvest management benefits by drying down crop and weed vegetative growth where there is late flushes of weeds, green vegetative crop growth or late tillering, which may interfere with harvest operations. Extremely cool, wet and/or cloudy weather conditions between the time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop drydown and harvest date. This herbicide is not a crop desiccant.
11. **Effects of Rainfall:** Rainfall within 2 hours after application may reduce performance.
12. **Movement in Soil:** Movement of this herbicide in soil is minimal.
13. **Grazing and Cropping Restrictions:** Wait 3 full days (72 hours) after application before swathing to allow thorough translocation for long term weed control. The crop may be harvested (straight cutting or swath pick up) 7 days after application. Treated crops can be fed to livestock and the straw can be baled for livestock bedding or feed. Vines, screenings and seed can also be fed to livestock.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (3,328). Skin and eye irritant.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage is not required.

Roundup Transorb/Roundup Original/Roundup Dry *(glyphosate)*

Group 9

Manufacturer: Monsanto Canada Inc

CAUTION IRRITANT

1. **Formulations:**

   Transorb: 360 g/L glyphosate acid equivalent (present as isopropylamine salt), 10 L, 115 L, 750 L.

   Original: 356 g/L glyphosate acid equivalent (present as isopropylamine salt), 10 L, 115 L, 750 L.

   Dry: Water soluble granules; 68.5 glyphosate acid equivalent (present as monoammonium salt), 10.95 kg/box.

2. **Registered Mixes:**

Zero till: Pardner + non-ionic surfactant.

Chemical fallow: 2,4-D amine (or Banvel or Pardner) + non-ionic surfactant.

Surfactants: Ag-Surf, Agral 90, Companion, Enhance, Frigate.

3. **Crops:** Prior to planting (all crops), fall stubble treatment, spot treatment (in-crop), non-crop areas, minimum or zero till cropping systems, pasture renovation, summer fallow, preharvest in flax (including linola), wheat, barley, oats, canola, lentils, peas, soybeans, dry beans, forages.

4. **Weeds Controlled:**

annual bluegrass (9.0)
annual sow-thistle
Canada fleabane
cleavers*
common ragweed
cow cockle*
dodder
downy brome
flixweed
giant foxtail
green foxtail
hemp-nettle
kochia
lady's-thumb
lamb's-quarters
large crabgrass
narrow-leaved hawk's-beard

narrow-leaved vetch
Persian darnel
prickly lettuce
redroot pigweed
Russian thistle
shepherd's-purse
stinkweed
volunteer barley
volunteer canola
volunteer corn
volunteer flax
volunteer mustard
volunteer wheat
wild buckwheat (6.7)
wild mustard
wild oats

alfalfa
Canada bluegrass
Canada thistle (7.8)
cattail
common milkweed
cottontop
curled dock
dandelion
field bindweed
foxtail barley
hemp dogbane

hoary cress
Japanese knotweed
Kentucky bluegrass
perennial sow-thistle
poison ivy
Purple loosestrife
quackgrass
smooth bromegrass
toadflax
wormwood
yellow nutsedge

alder
birch
maple
pine
poplar
raspberry
sheep laurel
snowberry
willow

* Transorb/Original only

5. **Weeds Suppressed:** Some weeds suppressed at lower rates.

6. **When Used:**

Annual weeds: Grassy and broadleaf weeds at least 15 cm tall and actively growing. Dodder: spot treatment in sugar beets.

Perennial weeds:

Canada thistle (bud stage): At or beyond bud stage of growth.

Canada thistle (fall rosette): 15 cm in diameter and at least 5 weeks of growth. Majority of them in a rosette stage.

Dandelion: Prior to seeding and post harvest.

Field bindweed: At or beyond full bloom and actively growing.

Milkweed: Bud to full bloom stage of growth.

Note: Reduced results may occur on plants treated after full bloom.

Quackgrass (spring, summer fallow, preharvest, fall stubble): At least 20 cm in height (3 - 4 leaf stage) of growth and actively growing.

Quackgrass (fall tilled ground): Delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

Other perennials: Mostly in head and early bud stage.

Brush: Actively growing brush from June through August.

2. Registered Mixes:

Zero till: Pardner + non-ionic surfactant.

Chemical fallow: 2,4-D amine (or Banvel or Pardner) + non-ionic surfactant.

Surfactants: Ag-Surf, Agral 90, Companion, Enhance, Frigate.

3. Crops: Prior to planting (all crops), fall stubble treatment, spot treatment (in-crop), non-crop areas, minimum or zero till cropping systems, pasture renovation, summer fallow, preharvest in flax (including linola), wheat, barley, oats, canola, lentils, peas, soybeans, dry beans, forages.

4. Weeds Controlled:

Annuals

- annual bluegrass (9.0)
- annual sow-thistle
- Canada fleabane
- cleavers*
- common ragweed
- cow cockle*
- dodder
- downy brome
- flixweed
- giant foxtail
- green foxtail
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarters
- large crabgrass
- narrow-leaved hawk's-beard
- narrow-leaved vetch
- Persian darnel
- prickly lettuce
- redroot pigweed
- Russian thistle
- shepherd's-purse
- stinkweed
- volunteer barley
- volunteer canola
- volunteer corn
- volunteer flax
- volunteer mustard
- volunteer wheat
- wild buckwheat (6.7)
- wild mustard
- wild oats

Perennials

- alfalfa
- Canada bluegrass
- Canada thistle (7.8)
- cattail
- common milkweed
- cottontop
- curled dock
- dandelion
- field bindweed
- foxtail barley
- hemp dogbane
- hoary cress
- Japanese knotweed
- Kentucky bluegrass
- perennial sow-thistle
- poison ivy
- Purple loosestrife
- quackgrass
- smooth bromegrass
- toadflax
- wormwood
- yellow nutsedge

Brush

- alder
- birch
- maple
- pine
- poplar
- raspberry
- sheep laurel
- snowberry
- willow

* Transorb/Original only

5. Weeds Suppressed: Some weeds suppressed at lower rates.

6. When Used:

Annual weeds: Grassy and broadleaf weeds at least 15 cm tall and actively growing. Dodder: spot treatment in sugar beets.

Perennial weeds:

Canada thistle (bud stage): At or beyond bud stage of growth.

Canada thistle (fall rosette): 15 cm in diameter and at least 5 weeks of growth. Majority of them in a rosette stage.

Dandelion: Prior to seeding and post harvest.

Field bindweed: At or beyond full bloom and actively growing.

Milkweed: Bud to full bloom stage of growth.

Note: Reduced results may occur on plants treated after full bloom.

Quackgrass (spring, summer fallow, preharvest, fall stubble): At least 20 cm in height (3 - 4 leaf stage) of growth and actively growing.

Quackgrass (fall tilled ground): Delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

Other perennials: Mostly in head and early bud stage.

Brush: Actively growing brush from June through August.

Roundup Transorb/Roundup Original/Roundup Dry (cont'd)

7. **How to Apply: Do not use galvanized steel or unlined steel tanks as a combustible gas may be formed.**

With: Ground equipment only: boom equipment, handgun, high volume equipment, wipers.

Rate:

Annual Weed Control

[illegible]	[illegible]	[illegible]	[illegible]	Comments (apply in 20 - 40 L/ac water)
0.3	0.16	- weeds up to 8 cm in height	- wild oats, green foxtail, volunteer barley, volunteer wheat, volunteer canola, wild mustard, lady's-thumb, stinkweed	- For wild oats, apply at 1 - 3 leaf stage. - Add 0.14 L of a surfactant registered for use such as Agral 90, Ag Surf and Companion. - For heavy wild oat infestations, use 0.4 L/ac rate.
0.4	0.21	- weeds 8 cm to 15 cm in height	- for annual grasses listed above plus foxtail barley* (suppression only), all other broad leaves listed above plus flixweed** and kochia**	- Add 0.14 L of surfactant registered for use as listed above. - Apply before initiation or senescence. **Suppression only.
0.51 - 0.77	0.27 - 0.40	- weeds up to 15 cm in height	- all annual grasses listed above plus downy brome, giant foxtail and Persian darnel - all annual broadleaved weeds listed above plus lamb's-quarters, redroot pigweed, hemp-nettle, flixweed, Russian thistle, volunteer flax, common ragweed*, Canada fleabane*, wild buckwheat**, narrow-leaved hawk's-beard***	- No additional surfactant is required. - ***Do not use** these rates on plants greater than 8 cm in height. - **For 3 - 4 leaf stage, use 0.77 L/ac rate. - ***For weeds 8 - 15 cm in height, use 0.77 L/ac rate.
0.91	0.48	- weeds up to 15 cm in height	- all annual grasses listed above, plus crab grass and annual blue grass - all broadleaved listed above plus kochia, prickly lettuce, shepherd's-purse, annual sow-thistle and narrow-leaved vetch	- For additional broadleaved weed control option, refer to tank mix table.
1.42	0.74	- weeds over 15 cm in height	- all annual grasses and broadleaved weeds listed above	- For additional broadleaved weed control option, refer to tank mix table.

7. **How to Apply: Do not use galvanized steel or unlined steel tanks as a combustible gas may be formed.**

With: Ground equipment only: boom equipment, handgun, high volume equipment, wipers.

Rate:

Annual Weed Control

Rate		**Growth stage**	**Weeds controlled**	**Comments (apply in 20 - 40 L/ac water)**
L/ac	**kg/ac**			
0.3	0.16	- weeds up to 8 cm in height	- wild oats, green foxtail, volunteer barley, volunteer wheat, volunteer canola, wild mustard, lady's-thumb, stinkweed	- For wild oats, apply at 1 - 3 leaf stage. - Add 0.14 L of a surfactant registered for use such as Agral 90, Ag Surf and Companion. - For heavy wild oat infestations, use 0.4 L/ac rate.
0.4	0.21	- weeds 8 cm to 15 cm in height	- for annual grasses listed above plus foxtail barley* (suppression only), all other broad leaves listed above plus flixweed** and kochia**	- Add 0.14 L of surfactant registered for use as listed above. - Apply before initiation or senescence. **Suppression only.
0.51 - 0.77	0.27 - 0.40	- weeds up to 15 cm in height	- all annual grasses listed above plus downy brome, giant foxtail and Persian darnel - all annual broadleaved weeds listed above plus lamb's-quarters, redroot pigweed, hemp-nettle, flixweed, Russian thistle, volunteer flax, common ragweed*, Canada fleabane*, wild buckwheat**, narrow-leaved hawk's-beard***	- No additional surfactant is required. - ***Do not use** these rates on plants greater than 8 cm in height. - **For 3 - 4 leaf stage, use 0.77 L/ac rate. - ***For weeds 8 - 15 cm in height, use 0.77 L/ac rate.
0.91	0.48	- weeds up to 15 cm in height	- all annual grasses listed above, plus crab grass and annual blue grass - all broadleaved listed above plus kochia, prickly lettuce, shepherd's-purse, annual sow-thistle and narrow-leaved vetch	- For additional broadleaved weed control option, refer to tank mix table.
1.42	0.74	- weeds over 15 cm in height	- all annual grasses and broadleaved weeds listed above	- For additional broadleaved weed control option, refer to tank mix table.

Annual Weed Control with Roundup Tank Mixtures for Summer fallow and Minimum Tillage Systems

Tank mixtures	Rate (per acre)		Weeds controlled	Comments (apply in 20 - 40 L/acre water and add 0.14 L/acre of surfactant)
Roundup + Banvel	0.3 L + 0.12 L	0.16 kg + 0.12 L	- volunteer cereals, wild oats, green foxtail, volunteer canola (rapeseed), wild mustard, flixweed*, lamb's-quarters, lady's-thumb, stinkweed, kochia, Russian thistle, cow cockle, redroot pigweed**, wild buckwheat**	- This tank mixture is registered for **summer fallow use only**. - Weeds should be less than 15 cm tall and actively growing for best results. Use higher rate if weeds are beyond 8 cm tall. - *Roundup is applied at 0.4 L/acre. - **Suppression only. See other tank mixtures for control option.
Roundup + Pardner	0.3 to 0.4 L + 0.5 L	0.16 to 0.17 kg + 0.5 L	- volunteer cereals, green foxtail, volunteer canola (rapeseed), wild mustard, lady's-thumb, stinkweed, wild buckwheat*, redroot pigweed**, kochia**, wild oats*	- This tank mixture is registered for **summer fallow use only** and prior to wheat, oats and barley in minimum tillage systems. Weeds should be at least 15 cm tall and actively growing for best results. - Use higher rate if weeds are beyond 8 cm in height. - *Use Roundup at 0.4 L/acre rate only for wild buckwheat control. - **0.4 L suppression only. See other tank mixtures for control option.
Roundup + 2,4-D amine	0.3 to 0.4 L + 0.48 L	0.16 to 0.21 kg + 0.48 L	- volunteer cereals, wild oats*, green foxtail*, volunteer canola (rapeseed), wild mustard, flixweed, redroot pigweed, lady's-thumb, stinkweed, kochia, lamb's-quarters, Russian thistle	- This tank mixture is registered for **summer fallow use only**. Weeds should be less than 15 cm tall and actively growing for best results. - Use higher rate if weeds are beyond 8 cm in height. - *Use Roundup at 0.4 L/acre for wild oats and green foxtail control. - **Suppression only. See other tank mixtures for control option.

Roundup Transorb/Roundup Original/Roundup Dry (cont'd)

Perennial Weed Control

Weed	Application				Comments
	Growth stage	Rate (L/ac)	kg/ac	Water volume (L/ac)	
Quackgrass (control, light to moderate infestations)	3 - 4 green leaves or more	1.0	0.53	20 - 120	- Allow 3 or more days after treatment before tillage. For higher water volumes (i.e. 60 - 120 L/ac), an approved surfactant must be added at 0.5 L per 100 L of clear water (0.5% V/V).
Quackgrass (long-term control, heavy infestations, high water volumes)	3 - 4 green leaves or more	1.0 to 2.8	0.53 to 1.5	20 - 120	- Allow 3 or more days after treatment before tillage. Rates higher than 1 L/ac will provide more consistent long-term control, especially with heavier infestations and/or higher water volumes (i.e. 60 - 120 L/ac)
Canada thistle	Rosette stage (summer fallow)	1.0	0.53	20 - 40	- Allow 10 or more days after treatment before tillage.
Canada thistle	Bud stage or beyond	1.9 to 2.8	1.0 to 1.5	20 - 120	- Allow 5 or more days after treatment before tillage.
Field bindweed	Full bloom or beyond	1.9 to 2.8	1.0 to 1.5	20 - 120	- Allow 7 or more days after treatment before tillage.
Common milkweed	Bud to full bloom Bud to full bloom (preharvest)	4.9 1.0	2.6 0.53	20 - 120 20 - 100	- Allow 7 or more days after treatment before tillage. Reduced control may occur after full bloom. Milkweed may not be present in a correct stage; therefore, repeat treatment may be required.
Toadflax	Vegetative stage (summer fallow) Bud to full bloom (preharvest)	1.0	0.53	20 - 40	- Allow 7 or more days after treatment before tillage.
Alfalfa	Early bud to full bloom stage Fall applications only	1.5 to 2.0	0.80 to 1.1	20 - 120	- Allow 5 or more days after treatment before tillage. Use the higher rates when alfalfa populations are high or when heavy grass infestations are also present. - For spring applications and control in minimum tillage systems using a 2,4-D tank mix, see section 8.
Dandelion	< 15 cm > 15 cm Rosette to full bloom (preharvest)	1.0 1.5 to 2.0 1.0	0.53 0.80 to 1.1 0.53	20 - 40 20 - 40 20 - 40	- Allow 3 or more days after treatment before tillage for all rates. Use the higher rates when infestations are heavy - Allow 7 or more days after preharvest treatment before tillage.
Foxtail barley	Seedling to heading	1.0 to 2.0	0.53 to 1.1	20 - 40	- Allow a minimum of 1 day after treatment before tillage or seeding. Use higher rate for larger, more established plants, heavy infestations or if plants are stressed.

Preplant or preseed application in direct seeding systems (all crops): 0.5 - 0.75 L/ac annual weeds up to 15 cm in height. Apply prior to seeding or after seeding, but before crop emergence for control of emerged weeds in direct seeding systems. Ensure weeds are at the desired stage at time of application. This product does not provide pre-emergent weed control, and newly germinating weeds may be a problem in the crop.

Water volume: Handgun, high volume (coarse sprays only): 80 - 120 L/ac. Boom: 20 - 120 L/ac. Chemical fallow, reduced rates: 20 - 40 L/ac. Always use clean water, free of sediments.

Pressure: 275 kPa.

Nozzles: Flat fan nozzles for volumes 20 - 40 L/ac: flood jet type or flat fan for volumes above 40 L/ac.

8. **Application Tips:** Tillage or mowing prior to application will reduce effectiveness on perennial weeds. Minimum (days) to wait before tillage after Roundup applications: annual weeds (1); spring and fall quackgrass (3); Canada thistle bud stage (5), fall rosette stage (7 - 10); field bindweed, milkweed, other perennials (7). Before commencing tillage, allow at least 3 full days (72 hours) after application for quackgrass control and 5 - 7 days after application for thistles if applied other than at early bud stage.

Quackgrass control:

Spring and fall treatments in annual and forage cropping systems: Apply to actively growing quackgrass. Reduced control may result if rhizomes become dormant. This may occur when soil fertility is poor or land has not been tilled for several years.

Application on forages should be followed by tillage and should be made when good growing conditions exist.

Fall treatments should be applied 3 - 4 weeks after swathing to actively growing quackgrass.Quackgrass can be treated after mild frost provided there are 3 - 4 green leaves actively growing at the time of application. Do not apply after first damaging frost in the fall. Frost of -5°C is usually tolerated by new shoots. Frost damage is evident by the drying of new shoots shortly after frost.

Allow 3 or more days after application before tillage.

For best results on fall tilled ground, delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

Canada thistle (fall rosette): Conduct summer fallow tillage as usual and perform last tillage operation between July 15 and August 1. Allow thistles to regrow for a minimum of 5 weeks until they are 15 cm in diameter and majority of them are in a rosette stage.

Toadflax: To ensure the proper timing, conduct summer fallow tillage as usual and perform the last tillage operation from July 15 to July 21. Allow toadflax to regrow for a minimum of four weeks following last tillage. When the toadflax reach the height of 15 cm and have a large number of green leaves, apply 1.0 L/ac. Wait a minimum of 7 days after application before tilling again.

Note: Canada thistle and toadflax can be treated after a mild frost provided the leaves are still green and actively growing at the time of application. Do not treat after first killing frost.

Alfalfa ploughdown (fall application only): Apply 1.5 L/ac at early bud to full bloom stage. Allow 5 or more days after treatment before tillage. Use the higher rate when alfalfa populations are high or when heavy grass infestations are present.

Alfalfa control with 2,4-D tank mix: For fall control of established stands of alfalfa, apply 1 - 2 L/ac of Roundup + 0.48 - 0.97 L/ac of any 500 g/L of 2,4-D amine or ester in 40 - 80 L/ac of water. For spring applications, use only the low rate of 2,4-D and 1 - 2 L/ac of Roundup. Only cereal crops not underseeded to legumes may be planted following spring applications of this tank mix. A 14 day interval between application and planting is required. Use the higher Roundup rates when perennial grasses are prevalent.

9. **How it Works:** A non-selective, systemic herbicide that moves from the foliage into the roots and kills the entire plant.

10. **Expected Results:** Wilting and yellowing of annuals occurs within 2 - 4 days; perennials require 7 - 10 days. Complete browning of above ground growth and deterioration of roots occurs. Cool or cloudy weather may slow activity.

11. **Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application.

12. **Movement in Soil:** The amount of glyphosate leaching is very low.

Roundup Transorb/Roundup Original/Roundup Dry (cont'd)

13. **Grazing and Cropping Restrictions:** All portions of the treated crops may be fed to livestock.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (4,320). Eye irritant. Non-toxic to bees, birds and fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage not required.

Roundup Ready Canola (Transorb/Original only)

Crop: Canola with Roundup Ready Gene.

Weeds controlled: Wild oats, green foxtail, volunteer barley, barnyard grass*, foxtail barley*, volunteer wheat, stinkweed, redroot pigweed, wild mustard, Russian thistle, lamb's-quarters, non-glyphosate-tolerant volunteer canola (repeseed), hemp-nettle, lady's-thumb, kochia, chickweed, corn spurry, wild tomato, quackgrass. For season-long control of Canada thistle and perennial sow-thistle, sequential applications are required.

Weeds controlled at higher rate: Cleavers, wild buckwheat, shepherd's-purse, cow cockle, night-flowering catchfly, smartweed, quackgrass (season-long control), stork's-bill*, flixweed*, narrow-leaved hawk's-beard*, round-leaved mallow*.

* Transorb only.

Weeds suppressed: Canada thistle, perennial sow-thistle, dandelion. Use the higher rate for suppression for 4 - 6 weeks.

Rate: 0.34 - 0.5 L/ac. No additional surfactant is required.

With: Ground application only. Do not apply by air.

Water volume: 20 - 40 L/ac.

Crop stage: 0 - 6 leaf stage.

Application tips: The lower rate can be used for the control of shepherd's-purse, cow cockle and night-flowering catchfly at the 1 - 3 leaf stage of the crop or for control of smartweed at the 4 - 6 leaf stage. A repeat application may improve performance. Ensure the crop has not advanced beyond the recommended growth stage.

Grazing and cropping restrictions: Always use pedigreed (i.e. certified) glyphosate-tolerant canola seed. Do not graze the treated crop or cut for hay; sufficient date are not available to support such use.

Preharvest Transorb/Original/Dry

Application may be made prior to harvest for the control of quackgrass, Canada thistle, common milkweed, toadflax, dandelion, season-long control of perennial sow-thistle and most annual weeds.

Crop: Wheat, barley (including malting barley), canola (rapeseed), dry beans, flax (including low linolenic acid varieties), lentils, oats, peas, forages and soyabean.

Rate:

Transorb/Original: 1 L/ac.

Dry: 0.53 kg/ac.

Forage crops only: Transorb/Original: 1 - 2 L/ac. Dry: 0.53 - 1.1 kg/ac.

With: Ground equipment. Only Roundup Original can be applied by air.

Crop timing: For annual crops, apply when average seed moisture content is at or below 30%. Accurate measurement of seed moisture content must be made before application. This stage typically occurs 7 - 14 days before harvest. For forage crops, apply at 1 - 2 L/ac 3 - 7 days prior to the last cut before rotation or forage renovation. Consult the table below for visual indicators of this stage in each crop.

M121

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Canola	less than 30%	Pods are green to yellow and most seeds are yellow to brown
Dry beans	less than 30%	Stems are green to brown; pods are mature (yellow to brown); 80% - 90% leaf drop (original leaves)
Flax (not including low linolenic acid varieties)	less than 30%	Majority 75% - 80% of bolls are brown
Forages	not applicable	Normal stage for forage harvesting
Lentils	less than 30%	Lowermost pods (bottom 15%) are brown and seeds rattle
Peas	less than 30%	Majority 75% - 80% of pods are brown
Soybeans	less than 30%	Stems are green to brown; pod tissue is dry and brown in appearance (80 - 90% leaf drop)
Wheat, barley, oats	less than 30%	Hard dough stage: a thumbnail impression remains on the seed

Weeds controlled: Canada thistle, common milkweed, dandelion, perennial sow-thistle (season-long), quackgrass, toadflax and most of the annual weeds.

Weed stage: For best weed control results, apply when quackgrass is actively growing and has at least 4 - 5 green leaves. For best results, Canada thistle and perennial sow-thistle should be actively growing and at or beyond the bud stage.

Application tip: This treatment may also provide harvest management benefits by drying down crop and vegetative crop growth and late tillering that may interfere with harvest operations. Apply only during the period 7 - 14 days (or 3 - 7 days for forage applications) before harvest to ensure best weed control and to maximize harvest-aid benefits. Earlier application may reduce crop yield and/or quality and may lead to excess glyphosate residues in the crop. Extremely cool, wet and/or cloudy weather between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry down and harvest date.

Caution:
Do not apply to any crops if grown for seed.
Consult malt buyers before using preharvest on malt barley. All portions of the treated crops may be fed to livestock.

Rustler *(glyphosate + dicamba)*

Group 4,9

Manufacturer: **Monsanto Canada Inc.**

DANGER CORROSIVE

1. **Formulations:** Water soluble liquid; 134 g/L glyphosate + 60 g/L Dicamba isopropylamine salt. 10 L, 115 L, 400 L containers.
2. **Registered Mixes:** 2,4-D.
3. **Crops:** Chemical fallow. Preseeding to cereal crop (wheat/barley).
4. **Weeds Controlled:**

cow cockle
downy brome
flixweed
green foxtail
kochia
lady's-thumb
lamb's-quarters
Persian darnel
redroot pigweed
Russian thistle
smartweed
stinkweed
volunteer cereals
volunteer rapeseed
wild buckwheat
wild mustard
wild oats

Guidelines for timing of pre-harvest applications

Crop(s)	Per cent grain moisture	Visual symptoms
Canola	less than 30%	Pods are green to yellow and most seeds are yellow to brown
Dry beans	less than 30%	Stems are green to brown; pods are mature (yellow to brown); 80% - 90% leaf drop (original leaves)
Flax (not including low linolenic acid varieties)	less than 30%	Majority 75% - 80% of bolls are brown
Forages	not applicable	Normal stage for forage harvesting
Lentils	less than 30%	Lowermost pods (bottom 15%) are brown and seeds rattle
Peas	less than 30%	Majority 75% - 80% of pods are brown
Soybeans	less than 30%	Stems are green to brown; pod tissue is dry and brown in appearance (80 - 90% leaf drop)
Wheat, barley, oats	less than 30%	Hard dough stage: a thumbnail impression remains on the seed

Weeds controlled: Canada thistle, common milkweed, dandelion, perennial sow-thistle (season-long), quackgrass, toadflax and most of the annual weeds.

Weed stage: For best weed control results, apply when quackgrass is actively growing and has at least 4 - 5 green leaves. For best results, Canada thistle and perennial sow-thistle should be actively growing and at or beyond the bud stage.

Application tip: This treatment may also provide harvest management benefits by drying down crop and vegetative crop growth and late tillering that may interfere with harvest operations. Apply only during the period 7 - 14 days (or 3 - 7 days for forage applications) before harvest to ensure best weed control and to maximize harvest-aid benefits. Earlier application may reduce crop yield and/or quality and may lead to excess glyphosate residues in the crop. Extremely cool, wet and/or cloudy weather between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry down and harvest date.

Caution:

Do not apply to any crops if grown for seed.

Consult malt buyers before using preharvest on malt barley. All portions of the treated crops may be fed to livestock.

Rustler *(glyphosate + dicamba)*

Group 4,9

DANGER CORROSIVE

Manufacturer: **Monsanto Canada Inc.**

1. **Formulations:** Water soluble liquid; 134 g/L glyphosate + 60 g/L Dicamba isopropylamine salt. 10 L, 115 L, 400 L containers.
2. **Registered Mixes:** 2,4-D.
3. **Crops:** Chemical fallow. Preseeding to cereal crop (wheat/barley).
4. **Weeds Controlled:**

cow cockle
downy brome
flixweed
green foxtail
kochia
lady's-thumb
lamb's-quarters
Persian darnel
redroot pigweed
Russian thistle
smartweed
stinkweed
volunteer cereals
volunteer rapeseed
wild buckwheat
wild mustard
wild oats

Rustler (cont'd)

5. **Weeds Suppressed:** Foxtail barley.
6. **When Used:**

Annual grassy weeds: Any time between emergence and heading, wild oats 1 - 3 leaf stage.

Annual broadleaf weeds: Up to 15 cm tall, wild buckwheat 1 - 4 leaf stage.

Foxtail barley: Before initiation of seed head or browning of lower leaves.

7. **How to Apply:**

With: Ground equipment only. Avoid galvanized steel or unlined steel (except stainless steel) spray tanks.

Rate:

Weeds	Rustler L/ac
Annual grassy weeds	1.0
Annual broadleaves	1.0
Foxtail barley	1.3
Above weeds + redroot pigweed	1.0 L/ac + 0.4 L/ac 2,4-D

Water volume: 20 - 40 L/ac **clean** water. Lower water volume may improve results, particularly with extremely hard water (greater than 700 ppm calcium + magnesium).

Pressure: 275 kPa.

Nozzles: Flat fan nozzles.

8. **Application Tips:**

For best control of winter annual weeds such as flixweed, 2,4-D should be applied to emerged, actively growing weeds in the fall previous to the fallow season or in early spring in the fallow season when winter annual weeds are less than 10 cm tall. Under certain stress conditions such as drought, cool temperatures or where extremely hard water (> 700 ppm Ca+Mg) has been used, weed control may be reduced with this product. However, lower water volume (20 L/ac) may improve results. Clean the entire sprayer after application of this product. Failure to clean the sprayer thoroughly may result in injury to desirable crops that are subsequently sprayed. First, add clean water to the tank and thoroughly rinse the entire spray system. Secondly, fill the tank with water and ammonia (1 L household ammonia/100 L water). Pump enough solution through the system to fill all parts completely. Then fill tank, close and leave for 24 hours before draining and rinsing with water.

9. **How it Works:** A post-emergent herbicide. Moves from foliage into roots and kills entire plant.
10. **Expected Results:** Visual effects will usually appear within 5 - 7 days. Wilting or yellowing of weeds advances to complete browning of above ground growth and deterioration of affected underground parts.
11. **Effects of Rainfall:** Heavy rainfall within 2 hours may wash the chemical off the foliage and repeat treatment may be required. Rainfall within 6 hours may reduce effectiveness.
12. **Movement in Soil:** The amount of leaching is very low.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest treated areas until plants have turned brown and started to deteriorate.

Succeeding crops: Do not seed a crop in a field treated with Rustler for at least 3 weeks after application. Certain broadleaf crops such as lentils, peas, canola and flax can be injured by a preseeding application of Rustler and should not be planted in a field that has been treated with this product.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = glyphosate (4,300); Dicamba (2,600). Eye irritant. May cause allergic skin reaction. Non-toxic to bees and birds. Can be absorbed through the skin and causes burns to skin and eyes.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

Rustler (cont'd)

5. **Weeds Suppressed:** Foxtail barley.
6. **When Used:**

   Annual grassy weeds: Any time between emergence and heading, wild oats 1 - 3 leaf stage.

   Annual broadleaf weeds: Up to 15 cm tall, wild buckwheat 1 - 4 leaf stage.

   Foxtail barley: Before initiation of seed head or browning of lower leaves.
7. **How to Apply:**

   With: Ground equipment only. Avoid galvanized steel or unlined steel (except stainless steel) spray tanks.

   Rate:

Weeds	Rustler L/ac
Annual grassy weeds	1.0
Annual broadleaves	1.0
Foxtail barley	1.3
Above weeds + redroot pigweed	1.0 L/ac + 0.4 L/ac 2,4-D

   Water volume: 20 - 40 L/ac **clean** water. Lower water volume may improve results, particularly with extremely hard water (greater than 700 ppm calcium + magnesium).

   Pressure: 275 kPa.

   Nozzles: Flat fan nozzles.
8. **Application Tips:**

   For best control of winter annual weeds such as flixweed, 2,4-D should be applied to emerged, actively growing weeds in the fall previous to the fallow season or in early spring in the fallow season when winter annual weeds are less than 10 cm tall. Under certain stress conditions such as drought, cool temperatures or where extremely hard water (> 700 ppm Ca+Mg) has been used, weed control may be reduced with this product. However, lower water volume (20 L/ac) may improve results. Clean the entire sprayer after application of this product. Failure to clean the sprayer thoroughly may result in injury to desirable crops that are subsequently sprayed. First, add clean water to the tank and thoroughly rinse the entire spray system. Secondly, fill the tank with water and ammonia (1 L household ammonia/100 L water). Pump enough solution through the system to fill all parts completely. Then fill tank, close and leave for 24 hours before draining and rinsing with water.
9. **How it Works:** A post-emergent herbicide. Moves from foliage into roots and kills entire plant.
10. **Expected Results:** Visual effects will usually appear within 5 - 7 days. Wilting or yellowing of weeds advances to complete browning of above ground growth and deterioration of affected underground parts.
11. **Effects of Rainfall:** Heavy rainfall within 2 hours may wash the chemical off the foliage and repeat treatment may be required. Rainfall within 6 hours may reduce effectiveness.
12. **Movement in Soil:** The amount of leaching is very low.
13. **Grazing and Cropping Restrictions:** Do not graze or harvest treated areas until plants have turned brown and started to deteriorate.

    Succeeding crops: Do not seed a crop in a field treated with Rustler for at least 3 weeks after application. Certain broadleaf crops such as lentils, peas, canola and flax can be injured by a preseeding application of Rustler and should not be planted in a field that has been treated with this product.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = glyphosate (4,300); Dicamba (2,600). Eye irritant. May cause allergic skin reaction. Non-toxic to bees and birds. Can be absorbed through the skin and causes burns to skin and eyes.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store above 5°C to keep product in solution. If crystals form, place in a warm room (20°C). Roll or shake solution until crystals have redissolved.

Select *(clethodim)*

Group 1

Manufacturer **Aventis Crop Science**

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; 240 g/L clethodim.
2. **Registered Mixes:** Addition of the adjuvant Amigo at 0.5% v/v is mandatory. Buctril M (400 mL/ac) in flax, including low linolenic varieties. Amigo must be used in tank mix of Select and Buctril M. Follow recommendations on Buctril M, Lontrel (flax, canola), MCPA ester (flax), Muster (canola) labels and Pursuit (field peas, Smart canola - 85 mL/ac or 42.5 mL/ac), Muster (8 or 12 g/ac), Liberty (Liberty Link Canola).
3. **Crops:** Canola, field peas, flax, lentils, linola (including low linolenic flax), potatoes, seedling alfalfa, soybeans, mustard (oriental, brown, yellow), sunflowers, chickpeas (Desi, Kabuli).
4. **Weeds Controlled:**

barnyard grass
fall panicum
green foxtail
large crabgrass
Persian darnel
proso millet
quackgrass
smooth crabgrass
volunteer barley
volunteer canary grass
volunteer corn
volunteer oat
volunteer wheat
wild oat
witchgrass
yellow foxtail

5. **Weeds Suppressed:** Quackgrass.
6. **When Used:**

Crops: Apply at any growth stage of crops listed above. Chickpeas: Before crop reaches the 9th node stage (18 cm height maximum).
When tank mixing Select plus Amigo with Buctril M for use in flax, do not spray in hot humid weather when daytime temperatures are over 25 - 29°C.

Weeds: Apply when the annual grasses and the volunteer cereals are in the 2 - 6 leaf stage. Apply Select when quackgrass is in the 2 - 5 leaf stage. Most effective when application is made at the 3 - 5 leaf stage, and the canopy is uniform and actively growing.

Select (cont'd)

7. **How to Apply:**

With: Ground equipment.

Rate:

Grass species	Leaf stage	Rate mL/ac	Rate of Amigo
Foxtail (green, yellow), wild oats, volunteer cereals.	2 - 4	50	0.5% v/v
Barnyard grass, witch grass, fall panicum, proso millet, volunteer corn, volunteer canary grass.	2 - 6	50	0.5% v/v
Wild oats, volunteer cereals, foxtail (green, yellow), Persian darnel, crabgrass, proso millet, witch grass, fall panicum, barnyard grass, quackgrass suppression, volunteer canary grass.	2 - 6	76	0.5% v/v
Quackgrass control	2 - 6	152	1.0% v/v

Water volume: 20 L/ac minimum - 80 L/ac maximum.

Pressure: 240 kPa minimum.

Nozzles: Flat fan recommended.

8. **Application Tips:** The use of 80° stainless steel flat fan nozzles tilted 45° forward is recommended for optimum spray coverage. Use high water volumes on dense crop canopies for better penetration to weeds. Best results will occur if applications are made to weeds not stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Select at 50 mL/ac should only be applied under the following conditions: good crop stand, early application (prior to tillering). Do not tank mix at lower rate with other pesticides. Do not apply the lower 50 mL/ac rate to volunteer winter cereals, crops with light to moderate weed infestation, crops with adequate moisture and fertility or crops with absence of stress.

9. **How it Works:** Select is a systemic herbicide that is translocated from the treated foliage to the growing points of leaves, shoots and roots.

10. **Expected Results:**

Weeds: Leaf foliage will first change from green to yellowish, then purplish and finally a brown color. The time required for complete control is 7 - 21 days following treatment, depending on growing conditions and crop competition.

11. **Effects of Rainfall:** Rainfall within one hour of application may reduce the effectiveness of the spray.

12. **Movement in Soil:** At recommended rates, very little movement occurs.

13. **Grazing and Cropping Restrictions:** Do not graze or feed treated foliage to livestock until 60 days after application. Field peas: 75 days after application. Seedling alfalfa: 30 days after application.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 3,610. Slightly toxic to rainbow trout.

Select (cont'd)

7. **How to Apply**:

With: Ground equipment.

Rate:

Grass species	Leaf stage	Rate (mL/ac)	Rate of Amigo
Foxtail (green, yellow), wild oats, volunteer cereals.	2 - 4	50	0.5% v/v
Barnyard grass, witch grass, fall panicum, proso millet, volunteer corn, volunteer canary grass.	2 - 6	50	0.5% v/v
Wild oats, volunteer cereals, foxtail (green, yellow), Persian darnel, crabgrass, proso millet, witch grass, fall panicum, barnyard grass, quackgrass suppression, volunteer canary grass.	2 - 6	76	0.5% v/v
Quackgrass control	2 - 6	152	1.0% v/v

Water volume: 20 L/ac minimum - 80 L/ac maximum.

Pressure: 240 kPa minimum.

Nozzles: Flat fan recommended.

8. **Application Tips**: The use of 80° stainless steel flat fan nozzles tilted 45° forward is recommended for optimum spray coverage. Use high water volumes on dense crop canopies for better penetration to weeds. Best results will occur if applications are made to weeds not stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Select at 50 mL/ac should only be applied under the following conditions: good crop stand, early application (prior to tillering). Do not tank mix at lower rate with other pesticides. Do not apply the lower 50 mL/ac rate to volunteer winter cereals, crops with light to moderate weed infestation, crops with adequate moisture and fertility or crops with absence of stress.

9. **How it Works**: Select is a systemic herbicide that is translocated from the treated foliage to the growing points of leaves, shoots and roots.

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Weeds: Leaf foliage will first change from green to yellowish, then purplish and finally a brown color. The time required for complete control is 7 - 21 days following treatment, depending on growing conditions and crop competition.

11. **Effects of Rainfall**: Rainfall within one hour of application may reduce the effectiveness of the spray.

12. **Movement in Soil**: At recommended rates, very little movement occurs.

13. **Grazing and Cropping Restrictions**: Do not graze or feed treated foliage to livestock until 60 days after application. Field peas: 75 days after application. Seedling alfalfa: 30 days after application.

14. **Toxicity**: Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 3,610. Slightly toxic to rainbow trout.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Does not require heated storage.

Sencor *(metribuzin)*

Group 5

Manufacturer: **Bayer Inc**

1. **Formulations:** Flowable; Sencor 500 F; 500 g/L; 4 x 5 L pack, 2 x 10 L pack. Water Dispersible Granular; Sencor 75 DF; 750 g/kg; 4 x 5 kg, 4 x 2.5 kg pack. Water Dispersible Granular in water soluble packets; Sencor 75 (Solupak) 5 x 0.5 kg bags; 4 x 2.5 kg per case.
2. **Registered Mixes:** Banvel (barley, wheat); Target (barley, wheat); MCPA Amine 500 (barley, wheat); Eptam (potatoes); 2,4-D Amine (barley and wheat); Edge or Treflan 545 EC (fababeans, field peas); MCPA-sodium salt (field peas), Eptam (potatoes).

   Mixing instructions: Shake container thoroughly before adding to spray tank. Mix Sencor in the tank before adding Edge or Treflan. Continually agitate until all the mixture is sprayed. Do not allow the sprayer to stand without agitation. When tank mixing with other products, add Sencor first then the tank mix partner, except when using Edge DC, which should be added first.

   Mixing restrictions: Do not tank mix with any other pesticide, wetting agent or surfactant.
3. **Crops:**

   alfalfa (established)
   asparagus
   barley (8.9)
   fababeans (8.6)*
   lentils (8.4)***
   peas, [field (8.5), processing (7.9)]
   potatoes (8.6)**
   tomatoes (processing)
   wheat, spring (8.5)
   wheat, winter

   Underseeding: Do not underseed.

   * Sencor + Treflan or Edge, **not** Sencor alone.
   ** Not on red skinned or any early maturing varieties.
   *** In lentils, Sencor may only provide weed suppression rather than control.

Sencor (cont'd)

4. Weeds Controlled:

Sencor alone, post-emergent

Chickpea, lentils, peas (field, processing)

- ball mustard (8.0)
- chickweed (8.1)
- corn spurry (7.1)
- green smartweed (8.5)
- hemp-nettle (8.4)
- lady's-thumb
- lamb's-quarters (8.4)
- stinkweed (8.2)
- tartary buckwheat (5.3)
- volunteer (non-triazine tolerant) canola (8.8)
- wild mustard

Barley, wheat, spring

- chickweed (8.1)
- corn spurry (7.1)
- common groundsel
- hemp-nettle (8.4)
- henbit (8.0)*
- lady's-thumb
- lamb's-quarters (8.4)
- mustard [ball, wild (8.0), wormseed (8.0)]
- night-flowering catchfly (sticky cockle)
- redroot pigweed (7.1)
- Russian thistle (7.2)*
- smartweeds (annual) (8.5)
- stinkweed (8.2)
- tartary buckwheat (5.3)
- volunteer canola (8.8)

Winter wheat**

- downy brome
- flixweed
- shepherd's-purse
- stinkweed (8.2)

Potatoes

- chickweed (8.1)
- corn spurry (7.1)
- green smartweed (8.5)
- hemp-nettle (8.4)
- lady's-thumb
- lamb's-quarters (8.4)
- mustard [ball, wild (8.0)]
- redroot pigweed (7.1)
- shepherd's-purse
- stinkweed (8.2)
- tartary buckwheat (5.3)
- volunteer canola (8.8)

* Apply Sencor at 225 mL/ac (150 g/ac) for control of these weeds.

** Apply Sencor in October or November post-emergent after secondary root development 345 mL/ac to 453 mL/ac (227 g/ac - 304 g/ac).

Sencor + Treflan preplant

- barnyard grass
- bluegrass, annual
- bromegrass
- buckwheat, wild
- chickweed
- cockle, cow
- darnel, Persian
- hemp-nettle
- knotweed
- lady's-thumb
- lamb's-quarters
- mustard, wild
- oats, wild
- pigweed, redroot
- thistle, Russian
- purslane
- rapeseed, volunteer
- shepherd's-purse
- smartweed, green
- stinkweed

Sencor + Edge preplant

- barnyard grass
- buckwheat, wild
- chickweed
- cow cockle
- foxtail (green, yellow)
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarters
- mustard, wild
- oats, wild, purslane
- pigweed, (prostrate, red root)
- rapeseed, volunteer
- shepherd's-purse
- smartweed, green
- stinkweed
- wheat, volunteer

5. Weeds Suppressed:

Canada thistle (6.6) and sow-thistle with Banvel; MCPA; or 2,4-D mixes in wheat and barley. Sencor + Edge: Volunteer barley, Russian thistle in fababean or field peas.

6. When Used:

Alfalfa (only irrigated): Sencor: In fall to dormant established stands. Injury may occur if Sencor is applied earlier than 18 months after seeding.

Barley, wheat: Do not use if soil has less than 3% organic matter. Sencor: 2 - 5 leaf. Banvel Mix: barley, 2 - 3 leaf; wheat, 2 - 4 leaf. MCPA Amine Mix: 3 - 5 leaf. Target Mix: barley, 2 - 3 leaf; wheat, 2 - 5 leaf. 2,4-D Amine Mix: 3 - 5 leaf.

Chickpea: Apply only up to the 3 node above ground stage. Application past this growth stage may result in damage to the crop.

Winter wheat (Norstar only): Apply in late fall after winter wheat has commenced tillering and initiated the development of secondary roots. Do not apply to irrigated wheat.

Fababeans: Treflan or Edge Mix: pre-plant incorporated spring or fall. Do not use on muck soils.

Lentils: Treflan mix: pre-plant incorporated, fall only. Do not use on soils with less than 4% organic matter.

Lentils, peas (post-emergent): Do not use if soil has less than 4% organic matter. Apply before vines are 15 cm long or before the 6 node stage and after weeds have emerged but are less than 5 cm in height or diameter. In peas and lentils, use a single post-emergence application or a post-emergence split application. Under certain field or weather conditions, a split application of Sencor may provide better weed control than a single application. The first application should be made at the cotyledon, 2 leaf stage, of the weeds. The second application should be made when a second flush of weeds have emerged or if weeds which were more advanced at time of first application have started to regrow. In field peas only, tank mix with MCPA-sodium salt at normal post-emergence application timing.

Peas, field: Treflan or Edge mix: pre-plant incorporated, spring or fall. Do not use on soils with less than 4% organic matter in fall or 5% in spring.

Potatoes: Sencor: post-emergent; before weeds are 4 cm tall. Eptam Mix: pre-plant incorporated. Do not use on muck soils. Eptam mix: pre-emerge through sprinkler irrigation system.

Note: Fall application of Sencor + Treflan or Edge is not recommended where soil drifting is a problem.

7. How to Apply:

Lentils, peas: Do not apply within 3 days after periods of cool, wet or cloudy weather as crop injury may occur. Plant lentils and peas at least 5 cm below the soil surface.

With: Ground equipment. Sencor can be affected by dusty conditions, particularly from wheel tracks; therefore, when these conditions are present, spray early in the day when dew will reduce dust. Slower sprayer speed will lower dust levels.

Rate:

[illegible]	Barley ml/ha (g/ha) + ml/ha	Bonanza, Leduc, Johnston AC Lacombe, [illegible] Malting Barley ml/ha (g/ha) + ml/ha	Wheat (spring) ml/ha (g/ha) + ml/ha
Sencor 500 F (75 DF) Alone	110 - 225 (80 - 150)	110 - 170 (80 - 110)	110 - 170 (80 - 110)
Sencor 500 F (75 DF) + Banvel 480	110 - 170 (80 - 110) + 93	Not Recommended	110 - 170 (80 - 110) + 93
Sencor 500 F (75 DF) + MCPA Amine	110 - 225 (80 - 150) + 345 - 445	110 (80) + 345 - 445	110 - 170 (80 - 110) + 345 - 445
Sencor 500 F (75 DF) + Target	110 - 170 (80 - 110) + 405 - 605	Not Recommended	110 - 170 (80 - 110) + 405 - 605
Sencor 500 F (75 DF) + 2,4-D Amine	110 - 225 (80 - 150) + 345 - 445	Not Recommended	110 - 170 (80 - 110) + 345 - 445

Sencor (cont'd)

4. **Weeds Controlled:**

Sencor alone, post-emergent

Chickpea, lentils, peas (field, processing)	Barley, wheat, spring	Winter wheat**	Potatoes
ball mustard (8.0)	chickweed (8.1)	downy brome	chickweed (8.1)
chickweed (8.1)	corn spurry (7.1)	flixweed	corn spurry (7.1)
corn spurry (7.1)	common groundsel	shepherd's-purse	green smartweed (8.5)
green smartweed (8.5)	hemp-nettle (8.4)	stinkweed (8.2)	hemp-nettle (8.4)
hemp-nettle (8.4)	henbit (8.0)*		lady's-thumb
lady's-thumb	lady's-thumb		lamb's-quarters (8.4)
lamb's-quarters (8.4)	lamb's-quarters (8.4)		mustard [ball, wild (8.0)]
stinkweed (8.2)	mustard [ball, wild (8.0), wormseed (8.0)]		redroot pigweed (7.1)
tartary buckwheat (5.3)	night-flowering catchfly (sticky cockle)		shepherd's-purse
volunteer (non-triazine tolerant) canola (8.8)	redroot pigweed (7.1)		stinkweed (8.2)
wild mustard	Russian thistle (7.2)*		tartary buckwheat (5.3)
	smartweeds (annual) (8.5)		volunteer canola (8.8)
	stinkweed (8.2)		
	tartary buckwheat (5.3)		
	volunteer canola (8.8)		

* Apply Sencor at 225 mL/ac (150 g/ac) for control of these weeds.

** Apply Sencor in October or November post-emergent after secondary root development 345 mL/ac to 453 mL/ac (227 g/ac - 304 g/ac).

Sencor + Treflan preplant

- barnyard grass
- bluegrass, annual
- bromegrass
- buckwheat, wild
- chickweed
- cockle, cow
- darnel, Persian
- hemp-nettle
- knotweed
- lady's-thumb
- lamb's-quarters
- mustard, wild
- oats, wild
- pigweed, redroot
- thistle, Russian
- purslane
- rapeseed, volunteer
- shepherd's-purse
- smartweed, green
- stinkweed

Sencor + Edge preplant

- barnyard grass
- buckwheat, wild
- chickweed
- cow cockle
- foxtail (green, yellow)
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarters
- mustard, wild
- oats, wild, purslane
- pigweed, (prostrate, red root)
- rapeseed, volunteer
- shepherd's-purse
- smartweed, green
- stinkweed
- wheat, volunteer

5. **Weeds Suppressed:** Canada thistle (6.6) and sow-thistle with Banvel; MCPA; or 2,4-D mixes in wheat and barley. Sencor + Edge: Volunteer barley, Russian thistle in fababean or field peas.

6. **When Used:**

Alfalfa (only irrigated): Sencor: In fall to dormant established stands. Injury may occur if Sencor is applied earlier than 18 months after seeding.

Barley, wheat: Do not use if soil has less than 3% organic matter. Sencor: 2 - 5 leaf. Banvel Mix: barley, 2 - 3 leaf; wheat, 2 - 4 leaf. MCPA Amine Mix: 3 - 5 leaf. Target Mix: barley, 2 - 3 leaf; wheat, 2 - 5 leaf. 2,4-D Amine Mix: 3 - 5 leaf.

Chickpea: Apply only up to the 3 node above ground stage. Application past this growth stage may result in damage to the crop.

Winter wheat (Norstar only): Apply in late fall after winter wheat has commenced tillering and initiated the development of secondary roots. Do not apply to irrigated wheat.

Fababeans: Treflan or Edge Mix: pre-plant incorporated spring or fall. Do not use on muck soils.

Lentils: Treflan mix: pre-plant incorporated, fall only. Do not use on soils with less than 4% organic matter.

Lentils, peas (post-emergent): Do not use if soil has less than 4% organic matter. Apply before vines are 15 cm long or before the 6 node stage and after weeds have emerged but are less than 5 cm in height or diameter. In peas and lentils, use a single post-emergence application or a post-emergence split application. Under certain field or weather conditions, a split application of Sencor may provide better weed control than a single application. The first application should be made at the cotyledon, 2 leaf stage, of the weeds. The second application should be made when a second flush of weeds have emerged or if weeds which were more advanced at time of first application have started to regrow. In field peas only, tank mix with MCPA sodium salt at normal post emergence application timing.

Peas, field: Treflan or Edge mix: pre-plant incorporated, spring or fall. Do not use on soils with less than 4% organic matter in fall or 5% in spring.

Potatoes: Sencor: post-emergent; before weeds are 4 cm tall. Eptam Mix: pre-plant incorporated. Do not use on muck soils. Eptam mix: pre-emerge through sprinkler irrigation system.

Note: Fall application of Sencor + Treflan or Edge is not recommended where soil drifting is a problem.

7. How to Apply:

Lentils, peas: Do not apply within 3 days after periods of cool, wet or cloudy weather as crop injury may occur. Plant lentils and peas at least 5 cm below the soil surface.

With: Ground equipment. Sencor can be affected by dusty conditions, particularly from wheel tracks; therefore, when these conditions are present, spray early in the day when dew will reduce dust. Slower sprayer speed will lower dust levels.

Rate:

Barley, wheat

Herbicide(s)	Barley mL/ac g/ac) + mL/ac	Klondike, Leduc, Johnston AC Lacombe, TR128, Manley Barley mL/ac (g/ac) + mL/ac	Wheat (spring) mL/ac (g/ac) + mL/ac
Sencor 500 F (75 DF) Alone	110 - 225 (80 - 150)	110 - 170 (80 - 110)	110 - 170 (80 - 110)
Sencor 500 F (75 DF) + Banvel 480	110 - 170 (80 - 110) + 93	Not Recommended	110 - 170 (80 - 110) + 93
Sencor 500 F (75 DF) + MCPA Amine	110 - 225 (80 - 150) + 345 - 445	110 (80) + 345 - 445	110 - 170 (80 - 110) + 345 - 445
Sencor 500 F (75 DF) + Target	110 - 170 (80 - 110) + 405 - 605	Not Recommended	110 - 170 (80 - 110) + 405 - 605
Sencor 500 F (75 DF) + 2,4-D Amine	110 - 225 (80 - 150) + 345 - 445	Not Recommended	110 - 170 (80 - 110) + 345 - 445

Sencor (cont'd)

Crop	Sencor 500 F-mL/ac	Sencor 75 DF-g/ac	Tank mixes
Alfalfa (only irrigated)	910	610	No mixes
Chickpea (post-emergent)	170	110	No mixes
Potatoes (pre-plant)*	225 - 345	150 - 225	Eptam 8-E, 1.70 - 2.2 L/ac
Potatoes (pre-emergent irrigation)	225 - 450		Eptam 8-E, 1.70 - 2.2 L/ac
Lentils (post-emergent)	170	110	No mixes
Lentils (post-emergent, split application)	85 - 110 + 85 - 110	55 - 75 + 55 - 75	No mixes
Peas (pre-plant)	170 - 225	110 - 150	See below
Peas (post-emergent, one application)	170 - 225	110 - 150	No mixes
Peas (post-emergent, split application)	85 - 110 + 85 - 110	55 - 75 + 55 - 75	No mixes
Peas (post-emergent)**	113	77	MCPA sodium salt 190 mL/ac
Potatoes (post-emergent)*	225	150	Sencor alone
Winter wheat	345 - 500	225 - 300	Sencor alone

* Not on red skinned or any early maturing varieties.

** Refer to Pea Pack.

Fababean, spring, pre-plant application

Soil type:	**Sandy soil**		**Loam-clay soils**	
Organic matter:	**2 - 3%**	**3 - 6%**	**6 - 10%**	**10 - 15%**
Sencor 500 DF (75 DF)	170 mL/ac (110 g/ac)	225 mL/ac (150 g/ac)	225-345 mL/ac (150 - 225 g/ac)	345 mL/ac (225 g/ac)
+ Treflan 545 EC	+ 610 mL/ac	+ 610 mL/ac	+ 810 - 1050 mL/ac	+ 810 - 1050 mL/ac
or + Edge DC	or + 560 g/ac	or + 560 g/ac	or + 770 g/ac	or + 770 g/ac

Fababean, fall, pre-plant application

Soil type:	**Sandy soil**		**Loam-clay soils**	
Organic matter:	**2 - 3%**	**3 - 6%**	**6 - 10%**	**10 - 15%**
Sencor 500 DF (75 DF)	225 mL/ac (150 g/ac)	285 mL/ac (190 g/ac)	285-345 mL/ac (190 - 225 g/ac)	345 mL/ac (225 g/ac)
+ Treflan 545 EC	+ 810 mL/ac	+ 810 mL/ac)	+ 1050 - 1300 mL/ac	+ 1050 - 1300 mL/ac
or + Edge DC	or + 770 g/ac	or + 770 g/ac	or + 930 g/ac	or + 930 g/ac

Field peas spring, pre-plant application

Soil type:	**Sandy soil**	**Loam-clay soils**	
Organic matter:	**5 - 6%**	**6 - 10%**	**10 - 15%**
Sencor 500 F (75 DF)	225 mL/ac (150 g/ac)	225 - 285 mL/ac (150 - 190 g/ac)	285 mL/ac (190 - 225 g/ac)
+ Treflan 545 EC	+ 610 mL/ac	+ 810 - 1050 mL/ac	+ 810 - 1050 mL/ac
or + Edge DC	or + 560 g/ac	or + 770 g/ac	or + 770 g/ac

Field peas, fall, pre-plant application

Soil type:	**Sandy soil**	**Loam-clay soils**	
Organic matter:	**4 - 6%**	**6 - 10%**	**10 - 15%**
Sencor 500F (75 DF)	285 mL/ac (190 g/ac)	285 - 345 mL/ac (190 - 255 g/ac)	345 mL/ac (225 g/ac)
+ Treflan 545 EC	+ 810 mL/ac	+ 1050 - 1300 mL/ac	+ 1050 - 1300 mL/ac
or + Edge DC	or + 770 g/ac	or + 930 g/ac	or + 930 g/ac

Lentils, fall, pre-plant incorporated		
Soil type:	**Sandy soil**	**Loam-clay soils**
Organic matter:	**4 - 6%**	**6 - 15%**
Sencor 500F (75 DF) + Treflan 545 EC	285 mL/ac (190 g/ac) + 810 mL/ac	285 - 345 mL/ac (190 - 255 g/ac) + 1050 - 1215 mL/ac

Water volume:

Barley, spring wheat, winter wheat, soybean, Fababean: 40 L/ac.

Chickpea, lentils, peas: 70 L/ac.

Potatoes, asparagus: 40 - 120 L/ac.
Higher rates of water increase crop tolerance.

Pressure: 200 - 275 kPa.

Nozzles: Tilt nozzles 45° forward for better spray penetration in post-emergent applications.

Screens: Use 50 mesh or larger nozzle screens or metal filters. Do not use felt filters.

Incorporation:

Sencor + Eptam: On potatoes, see *Eptam*.

Sencor + Treflan or Edge: On fababeans and field peas: Apply and incoporate in the same operation if possible. Must be incorporated within 24 hours. Work twice in different directions. Use a tandem disc, discer or vibrashank type cultivator to cut 8 - 10 cm deep. Operate disc implements at 7 - 10 km/[illegible] cultivators at 10 - 13 km/h.

With irrigation:

Sencor + Eptam: Potatoes: pre-emergence in sprinkler irrigation. Apply specified dosage in 3 - 8 mm of water per acre on a continuous injection in centre pivot systems, or in the last 15 - 30 minutes of set in permanent solid set sprinkler system of self-propelled wheel move systems. On sandy soil, apply in 3 - 5 mm of water and use the lower rate of Sencor and Eptam. Apply pre-emergence to crop and weeds. Use the higher rate for control of grassy weeds or when broadleaf weeds are dense.

8. **Application Tips:** Allow 4 - 5 days between application of Sencor and post-emergent wild oat herbicides. Allow 4 - 5 days after frost for crop to recover before applying Sencor. Weed control may be reduced if Sencor is applied later than the 5 leaf stage of crop. Crop may be sprayed when wet with dew. Crop must be planted at least 5 cm below soil surface.

   Sencor + Treflan or Edge: Cultivate to destroy existing weeds before application. On stubble fields, chop and thoroughly mix crop residues into soil to a depth of 10 - 15 cm. Disc type implements provide the best results. To avoid concentrating wild oat seeds below the treated layer and causing soil erosion, do not plow (moldboard) land prior to application. On variable soils with light, sandy areas, some injury may occur on the sandy areas if the rate used is for loam-clay soils. On soils with 10% organic matter and higher, broadleaf weed control may not be adequate. Do not apply to wet soils or soils subjected to periods of flooding. Do not incorporate with a field cultivator when the soil is crusted, lumpy or too wet for good mixing action.

   Sencor post-emergence: For optimum weed control, it is important to apply Sencor post-emergent when weeds have just emerged and are very small. Crop tolerance is not affected by early application.

9. **How it Works:** A systemic herbicide absorbed by leaves and roots and translocated to new growth. Inhibits photosynthesis and the weed turns brown and dies.

10. **Expected Results:**

    Broadleaf weeds: Initial yellowing 5 - 7 days after application; weeds turn brown and die within 14 - 16 days. Active in soil for a short period and can control new shallow-rooted germinants, like chickweed.

    Crops: In extremely hot weather or when frost occurs within 1 - 2 days of application, crop will show some yellowing and slight reduction in height. Discoloration disappears in 7 - 10 days. On Klondike, Johnston, AC Lacombe and Leduc barley varieties, temporary lightening in color and reduction in height may occur. Lentils and peas provide little competition against weed growth due to their low growth habit. Under heavy weed infestations or lush growth, control may be poor.

Sencor (cont'd)

Crop	Sencor 500 F-mL/ac	Sencor 75 DF-g/ac	Tank mixes
Alfalfa (only irrigated)	910	610	No mixes
Chickpea (post emergent)	170	110	No mixes
Potatoes (pre plant)*	225 - 345	150 - 225	Eptam 8-E 1.70 - 2.2 L/ac
Potatoes (pre-emergent irrigation)	225 - 450		Eptam 8-E 1.70 - 2.2 L/ac
Lentils (post emergent)	170	110	No mixes
Lentils (post-emergent split application)	85 - 110 + 85 - 110	55 - 75 + 55 - 75	No mixes
Peas (pre-plant)	170 - 225	110 - 150	See below
Peas (post-emergent, one application)	170 - 225	110 - 150	No mixes
Peas (post-emergent, split application)	85 - 110 + 85 - 110	55 - 75 + 55 - 75	No mixes
Peas (post-emergent)**	113	77	MCPA sodium salt 190 mL/ac
Potatoes (post emergent)*	225	150	Sencor alone
Winter wheat	345 - 500	225 - 300	Sencor alone

* Not on red skinned or any early maturing varieties.

** Refer to Pea Pack.

Fababean, spring, pre-plant application

Soil type:	**Sandy soil**		**Loam-clay soils**	
Organic matter:	**2 - 3%**	**3 - 6%**	**6 - 10%**	**10 - 15%**
Sencor 500 DF (75 DF)	170 mL/ac (110 g/ac)	225 mL/ac (150 g/ac)	225 - 345 mL/ac (150 - 225 g/ac)	345 mL/ac (225 g/ac)
+ Treflan 545 EC	+ 610 mL/ac	+ 610 mL/ac	+ 810 - 1050 mL/ac	+ 810 - 1050 mL/ac
or + Edge DC	or + 560 g/ac	or + 560 g/ac	or + 770 g/ac	or + 770 g/ac

Fababean, fall, pre-plant application

Soil type:	**Sandy soil**		**Loam-clay soils**	
Organic matter:	**2 - 3%**	**3 - 6%**	**6 - 10%**	**10 - 15%**
Sencor 500 DF (75 DF)	225 mL/ac (150 g/ac)	285 mL/ac (190 g/ac)	285 - 345 mL/ac (190 - 225 g/ac)	345 mL/ac (225 g/ac)
+ Treflan 545 EC	+ 810 mL/ac	+ 810 mL/ac)	+ 1050 - 1300 mL/ac	+ 1050 - 1300 mL/ac
or + Edge DC	or + 770 g/ac	or + 770 g/ac	or + 930 g/ac	or + 930 g/ac

Field peas spring, pre-plant application

Soil type:	**Sandy soil**	**Loam-clay soils**	
Organic matter:	**5 - 6%**	**6 - 10%**	**10 - 15%**
Sencor 500 F (75 DF)	225 mL/ac (150 g/ac)	225 - 285 mL/ac (150 - 190 g/ac)	285 mL/ac (190 - 225 g/ac)
+ Treflan 545 EC	+ 610 mL/ac	+ 810 - 1050 mL/ac	+ 810 - 1050 mL/ac
or + Edge DC	or + 560 g/ac	or + 770 g/ac	or + 770 g/ac

Field peas, fall, pre-plant application

Soil type:	**Sandy soil**	**Loam-clay soils**	
Organic matter:	**4 - 6%**	**6 - 10%**	**10 - 15%**
Sencor 500F (75 DF)	285 mL/ac (190 g/ac)	285 - 345 mL/ac (190 - 255 g/ac)	345 mL/ac (225 g/ac)
+ Treflan 545 EC	+ 810 mL/ac	+ 1050 - 1300 mL/ac	+ 1050 - 1300 mL/ac
or + Edge DC	or + 770 g/ac	or + 930 g/ac	or + 930 g/ac

Lentils, fall, pre-plant incorporated

Soil type:	**Sandy soil**	**Loam-clay soils**
Organic matter:	**4 - 6%**	**6 - 15%**
Sencor 500F (75 DF) + Treflan 545 EC	285 mL/ac (190 g/ac) + 810 mL/ac	285 - 345 mL/ac (190 - 255 g/ac) + 1050 - 1215 mL/ac

Water volume:

Barley, spring wheat, winter wheat, soybean, Fababean: 40 L/ac.

Chickpea, lentils, peas: 70 L/ac.

Potatoes, asparagus: 40 - 120 L/ac.
Higher rates of water increase crop tolerance.

Pressure: 200 - 275 kPa.

Nozzles: Tilt nozzles 45° forward for better spray penetration in post-emergent applications.

Screens: Use 50 mesh or larger nozzle screens or metal filters. Do not use felt filters.

Incorporation:

Sencor + Eptam: On potatoes, see *Eptam*.

Sencor + Treflan or Edge: On fababeans and field peas: Apply and incoporate in the same operation if possible. Must be incorporated within 24 hours. Work twice in different directions. Use a tandem disc, discer or vibrashank type cultivator to cut 8 - 10 cm deep. Operate disc implements at 7 - 10 km/h; cultivators at 10 - 13 km/h.

With irrigation:

Sencor + Eptam: Potatoes: pre-emergence in sprinkler irrigation. Apply specified dosage in 3 - 8 mm of water per acre on a continuous injection in centre pivot systems, or in the last 15 - 30 minutes of set in permanent solid set sprinkler system of self-propelled wheel move systems. On sandy soil, apply in 3 - 5 mm of water and use the lower rate of Sencor and Eptam. Apply pre-emergence to crop and weeds. Use the higher rate for control of grassy weeds or when broadleaf weeds are dense.

8. **Application Tips**: Allow 4 - 5 days between application of Sencor and post-emergent wild oat herbicides. Allow 4 - 5 days after frost for crop to recover before applying Sencor. Weed control may be reduced if Sencor is applied later than the 5 leaf stage of crop. Crop may be sprayed when wet with dew. Crop must be planted at least 5 cm below soil surface.

   Sencor + Treflan or Edge: Cultivate to destroy existing weeds before application. On stubble fields, chop and thoroughly mix crop residues into soil to a depth of 10 - 15 cm. Disc type implements provide the best results. To avoid concentrating wild oat seeds below the treated layer and causing soil erosion, do not plow (moldboard) land prior to application. On variable soils with light, sandy areas, some injury may occur on the sandy areas if the rate used is for loam-clay soils. On soils with 10% organic matter and higher, broadleaf weed control may not be adequate. Do not apply to wet soils or soils subjected to periods of flooding. Do not incorporate with a field cultivator when the soil is crusted, lumpy or too wet for good mixing action.

   Sencor post-emergence: For optimum weed control, it is important to apply Sencor post-emergent when weeds have just emerged and are very small. Crop tolerance is not affected by early application.

9. **How it Works**: A systemic herbicide absorbed by leaves and roots and translocated to new growth. Inhibits photosynthesis and the weed turns brown and dies.

10. **Expected Results**:

    Broadleaf weeds: Initial yellowing 5 - 7 days after application; weeds turn brown and die within 14 - 16 days. Active in soil for a short period and can control new shallow rooted germinants, like chickweed.

    Crops: In extremely hot weather or when frost occurs within 1 - 2 days of application, crop will show some yellowing and slight reduction in height. Discoloration disappears in 7 - 10 days. On Klondike, Johnston, AC Lacombe and Leduc barley varieties, temporary lightening in color and reduction in height may occur. Lentils and peas provide little competition against weed growth due to their low growth habit. Under heavy weed infestations or lush growth, control may be poor.

Sencor (cont'd)

Field peas and lentils:
Stress such as disease, cold, deep planting, excessive moisture, high salts or drought may weaken seedlings and increase the possibility of damage. Temporary lightening on the margins of cotyledons and a slight delay in development may occur. Ensure 70 L/ac water volume is used to reduce crop injury.

11. **Effects of Rainfall:** Rainfall within 6 hours after application may reduce weed control.
12. **Movement in Soil:** Little leaching occurs in soils with high organic matter.
13. **Grazing and Cropping Restrictions:** Do not graze or feed treated crop to livestock within 30 days of application (lentils, peas: 70 days).

    Application to harvest interval (days): Grain (60); potatoes (60); lentils, peas (70).

    Succeeding crops: 24 months are required for crops other than potatoes if 910 mL/ac (610 g/ac) is applied on irrigated alfalfa. Canola, celery, cole crops, cucurbits, lettuce, onions, peppers, spinach, sugar beets, sunflowers, table beets and turnips may be injured if planted in soil treated with Sencor during the year of application and the following crop year. Fall seeded or cover crops such as wheat, oats, and rye may be injured when seeded in the same season as the application of Sencor. For pre-plant applications of Sencor + Treflan or Edge, oats, sugar beets, creeping red fescue and small-seeded grasses (e.g., timothy, canary seed) should not be planted the following crop year as a precaution.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,100 - 2,300). Slightly toxic to fish and birds.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** No damage by freezing but avoid large temperature fluctuations. Store in a cool, dry place.

    Note: A similar product is Lexone.

Stampede EDF *(propanil)*

Group 7

Manufacturer: Rohm and Haas

WARNING POISON WARNING CORROSIVE

1. **Formulations**: Extruded Dry Flowable; 80%; 10 kg.
2. **Registered Mixes:** Stampede EDF should **not** be used alone. Always apply as a tank mix with 2,4-D or MCPA or Refine Extra + surfactant..

    Mixing instructions: Add 1/2 required amount of water to spray tank and start agitation. Slowly add Stampede EDF. Then add 2,4-D or MCPA. Add remainder of water.
3. **Crops**: Barley (8.4), flax (8.4), oats (8.9), wheat [durum (8.7), spring (8.8)], canary seed.
4. **Weeds Controlled:**

Stampede EDF + MCPA (Ester or Amine): Barley, canary seed, flax, oats, wheat.

bluebur* (7.8)
buckwheat [tartary (8.6),
wild (7.1)]
flixweed* (7.4)
foxtail [green (7.1), yellow]
kochia* (6.7)
lady's-thumb
lamb's-quarters (8.7)
mustard, wild (7.5)
pigweed, redroot (8.8)
rapeseed, volunteer (8.8)
shepherd's-purse (9.0)
smartweeds (8.6)
stinkweed* (8.7)
volunteer canola

Stampede EDF + 2,4-D (Amine or Ester): Wheat.

bluebur*
buckwheat (tartary, wild)
burdock*
clover, sweet
cocklebur
flixweed*
foxtail (green, yellow)
goat's-beard*
hawk's-beard, narrow-leaved*
kochia*
lady's-thumb
lamb's-quarters
lettuce, prickly
mustard, wild (7.3)
pigweed (redroot, Russian)
plantain
radish, wild
rapeseed, volunteer
shepherd's-purse
smartweeds, annual
stinkweed
sunflower, annual
thistle, Russian (7.5)

Stampede EDF + Refine Extra and Surfactant: Wheat (including durum), barley, oats.

buckwheat (wild)
chickweed
foxtail (green, yellow)
hemp-nettle
lamb's-quarters
redroot pigweed
Russian thistle
smartweed
volunteer canola
wild mustard

*In seedling or rosette stage.

5. **Weeds Suppressed:** None.

6. **When Used:**

Weeds: 1 - 4 leaf stage. Seedling or rosette stage for bluebur, kochia, flixweed, hawk's-beard, shepherd's-purse, stinkweed. Green foxtail: when the majority of plants are in the 3 leaf stage (less than 2.5 cm tall), effectiveness declines rapidly after the 5th leaf. Under dry conditions (soil moisture deeper than 5 cm), apply when green foxtail is in the 2 - 3 leaf stage.

Crops: MCPA Mix: Cereals 2 - 5 leaf stage only; Flax between 5 - 12.5 cm tall. Canary seed 2 - 4 leaf stage. 2,4-D Mix: Wheat 3 - 5 leaf stage only. Refine Extra mix: Cereals: 2 - 5 leaf stage.

Temperature effects: Do not spray crops when daily temperatures remain below 10 C or when they are expected to exceed 30 C. Under hot, dry and low relative humidity conditions, spray during early morning or evening. Avoid spraying if crop is recovering from frost damage or if frost is expected within 24 hours.

7. **How to Apply:**

With: Ground equipment only. Spra-coupe not recommended. Do not apply by air.

Rate:

Stampede EDF: 0.5 kg/ac.

MCPA Amine or Ester 500: 325 mL/ac; 2,4-D amine 500: 325 mL/ac, 2,4-D ester 600: 270 mL/ac (spring wheat).

MCPA Ester 500: 225 mL/ac; 2,4-D amine 500: 325 mL/ac, 2,4-D ester 600: 270 mL/ac (durum wheat).

MCPA Ester 500. 225 mL/ac (barley, oats, canary seed, flax).

Refine Extra plus surfactant: 8 g/ac + 0.2 L/100 L of spray volume (wheat, durum, barley, oats).

Surfactant: any non ionic surfactant such as Companion, Citowett Plus, Agsurf or Agral 90.

Water volume: Field sprayers: 45 L/ac. Floater type equipment: 65 L/ac.

Pressure: 275 kPa.

Nozzles: Only flat fan nozzles and 50 mesh screens.

Ground speed: 8 km/h for field sprayers, 20 km/h or less for floaters.

8. **Application Tips:** Drain and flush sprayer tank and lines after spraying is completed. Do not apply Stampede EDF to crops grown in fields in which Atrazine or other triazine herbicides (such as Lexone, Sencor, Bladex, Blagal, Marksman, Simadex, Princep, Laddok) have been applied until soil analysis confirms that the residues have completely disappeared. A 3 day interval is required before or after an application of Stampede EDF and another herbicide.

Sencor (cont'd)

Field peas and lentils:
Stress such as disease, cold, deep planting, excessive moisture, high salts or drought may weaken seedlings and increase the possibility of damage. Temporary lightening on the margins of cotyledons and a slight delay in development may occur. Ensure 70 L/ac water volume is used to reduce crop injury.

11. **Effects of Rainfall:** Rainfall within 6 hours after application may reduce weed control.
12. **Movement in Soil:** Little leaching occurs in soils with high organic matter.
13. **Grazing and Cropping Restrictions:** Do not graze or feed treated crop to livestock within 30 days of application (lentils, peas: 70 days).

    Application to harvest interval (days): Grain (60); potatoes (60); lentils, peas (70).

    Succeeding crops: 24 months are required for crops other than potatoes if 910 mL/ac (610 g/ac) is applied on irrigated alfalfa. Canola, celery, cole crops, cucurbits, lettuce, onions, peppers, spinach, sugar beets, sunflowers, table beets and turnips may be injured if planted in soil treated with Sencor during the year of application and the following crop year. Fall seeded or cover crops such as wheat, oats, and rye may be injured when seeded in the same season as the application of Sencor. For pre-plant applications of Sencor+Treflan or Edge, oats, sugar beets, creeping red fescue and small-seeded grasses (e.g., timothy, canary seed) should not be planted the following crop year as a precaution.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1,100 - 2,300). Slightly toxic to fish and birds.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** No damage by freezing but avoid large temperature fluctuations. Store in a cool, dry place.

    Note: A similar product is Lexone.

Stampede EDF *(propanil)*

Group 7

Manufacturer: **Rohm and Haas**

WARNING POISON

WARNING CORROSIV

1. **Formulations:** Extruded Dry Flowable; 80%; 10 kg.
2. **Registered Mixes:** Stampede EDF should **not** be used alone. Always apply as a tank mix with 2,4-D or MCPA or Refine Extra + surfactant..

   Mixing instructions: Add 1/2 required amount of water to spray tank and start agitation. Slowly add Stampede EDF. Then add 2,4-D or MCPA. Add remainder of water.
3. **Crops:** Barley (8.4), flax (8.4), oats (8.9), wheat [durum (8.7), spring (8.8)], canary seed.
4. **Weeds Controlled:**

[illegible]

bluebur* (7.8)
buckwheat [tartary (8.6), wild (7.1)]
flixweed* (7.4)
foxtail [green (7.1), yellow]
kochia* (6.7)
lady's-thumb
lamb's-quarters (8.7)
mustard, wild (7.5)
pigweed, redroot (8.8)
rapeseed, volunteer (8.8)
shepherd's-purse (9.0)
smartweeds (8.6)
stinkweed* (8.7)
volunteer canola

Stampede EDF + 2,4-D (Amine or Ester) Wheat

- bluebur*
- buckwheat (tartary, wild)
- burdock*
- clover, sweet
- cocklebur
- flixweed*
- foxtail (green, yellow)
- goat's-beard*
- hawk's-beard, narrow-leaved*
- kochia*
- lady's-thumb
- lamb's-quarters
- lettuce, prickly
- mustard, wild (7.3)
- pigweed (redroot, Russian)
- plantain
- radish, wild
- rapeseed, volunteer
- shepherd's-purse
- smartweeds, annual
- stinkweed
- sunflower, annual
- thistle, Russian (7.5)

Stampede EDF + Refine Extra and Surfactant: Wheat (including durum), barley, oats.

- buckwheat (wild)
- chickweed
- foxtail (green, yellow)
- hemp-nettle
- lamb's-quarters
- redroot pigweed
- Russian thistle
- smartweed
- volunteer canola
- wild mustard

* In seedling or rosette stage.

5. **Weeds Suppressed:** None.

6. **When Used:**

Weeds: 1 - 4 leaf stage. Seedling or rosette stage for bluebur, kochia, flixweed, hawk's-beard, shepherd's-purse, stinkweed. Green foxtail: when the majority of plants are in the 3 leaf stage (less than 2.5 cm tall), effectiveness declines rapidly after the 5th leaf. Under dry conditions (soil moisture deeper than 5 cm), apply when green foxtail is in the 2 - 3 leaf stage.

Crops: MCPA Mix: Cereals 2 - 5 leaf stage only; Flax between 5 - 12.5 cm tall, Canary seed 2 - 4 leaf stage. 2,4-D Mix: Wheat 3 - 5 leaf stage only. Refine Extra mix: Cereals: 2 - 5 leaf stage.

Temperature effects: Do not spray crops when daily temperatures remain below 10°C or when they are expected to exceed 30°C. Under hot, dry and low relative humidity conditions, spray during early morning or evening. Avoid spraying if crop is recovering from frost damage or if frost is expected within 24 hours.

7. **How to Apply:**

With: Ground equipment only. Spra-coupe not recommended. Do not apply by air.

Rate:

Stampede EDF: 0.5 kg/ac.

MCPA Amine or Ester 500: 325 mL/ac; 2,4-D amine 500: 325 mL/ac, 2,4-D ester 600: 270 mL/ac (spring wheat).

MCPA Ester 500: 225 mL/ac; 2,4-D amine 500: 325 mL/ac, 2,4-D ester 600: 270 mL/ac (durum wheat).

MCPA Ester 500: 225 mL/ac (barley, oats, canary seed, flax).

Refine Extra plus surfactant: 8 g/ac + 0.2 L/100 L of spray volume (wheat, durum, barley, oats).

Surfactant: any non ionic surfactant such as Companion, Citowett Plus, Agsurf or Agral 90.

Water volume: Field sprayers: 45 L/ac. Floater type equipment: 65 L/ac.

Pressure: 275 kPa.

Nozzles: Only flat fan nozzles and 50 mesh screens.

Ground speed: 8 km/h for field sprayers, 20 km/h or less for floaters.

8. **Application Tips:** Drain and flush sprayer tank and lines after spraying is completed. Do not apply Stampede EDF to crops grown in fields in which Atrazine or other triazine herbicides (such as Lexone, Sencor, Bladex, Blagal, Marksman, Simadex, Princep, Laddok) have been applied until soil analysis confirms that the residues have completely disappeared. A 3 day interval is required before or after an application of Stampede EDF and another herbicide.

Stampede EDF (cont'd)

Insecticide intervals: Severe crop injury may result from a tank mix or separate applications of Stampede EDF and certain insecticides in the same crop year (e.g., Sevin (carbaryl), parathion methyl or Guthion). Decis may be applied any time before or after Stampede EDF or tank mixed with Stampede EDF. After applying Stampede EDF, wait a minimum of 5 days for wheat and 10 days for barley before applying Furadan. After applying Stampede EDF, wait a minimum of 14 days before applying dimethoate (Cygon) or Malathion. No other insecticides are registered for foliar use in the same year as Stampede EDF. Do not spray with Stampede EDF if the field was treated with soil-applied systemic organophosphorous insecticides in the same or previous crop year.

9. **How it Works:** Absorbed by leaves and causes cell wall breakdown and interference with the cellular metabolism. Activity is primarily contact; therefore, thorough spray coverage is necessary for optimum weed control. Susceptible weeds become tolerant beyond the 4 leaf stage. Stress conditions will trigger a hardening- off process and hasten the development of tolerance to chemical control.

10. **Expected Results:**

    Weeds: Affected weeds turn brown in 3 - 5 days and have a "burnt-off," or desiccated appearance. Weeds past the recommended stage will show extensive browning, but some degree of green tissue remains. New tissue is produced, and the weed will recover. Weeds emerging after spraying are unaffected.

    Crops: Temporary yellowing and leaf tip burn occur and are more pronounced in oats, flax and barley than in wheat. Effects will disappear 10 - 14 days after treatment. New growth is not affected and yields are not reduced. Under stress conditions, a slight delay in crop maturity may be noticed.

11. **Effects of Rainfall:** Light rainfall 1 hour after application does not reduce weed control. A heavy rain of 25 mm or more within 4 hours of application may reduce control.

12. **Movement in Soil:** Propanil is relatively non-mobile.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; sufficient data are not available to support such use.

    Drift: Danger is low; however, avoid spray drift to susceptible crops such as rapeseed, sunflowers, vegetables or ornamentals.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (560), Stampede EDF (3,130). Propanil has potential to cause chlorachne, a skin disease in man following long-term exposure.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Giddiness, intoxication and headache.

16. **Storage:** Heated storage not required.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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Sundance *(sulfosulfuron)*

Group 2

Manufacturer **Monsanto Canada Inc.**

WARNING POISON

1. **Formulations:** Water dispersible granule; 75%; 4 x 216 g pouches Sundance + 2 x 8 L Merge.
2. **Registered Mixes:** The following mixing instructions will be revised for the 2000 crop season. Please check the label or contact a Monsanto representative.

   Mixing instructions: Fill the spray tank 3/4 full and start agitation. Slowly add Sundance granules (11g/ac). Add the broadleaf herbicide. Add Merge (202 mL/ac) and complete the filling process, while maintaining agitation. Maintain an air gap during filling and remove the hose from the mixing tank immediately after filling to avoid siphoning back into the carrier source. Spray solutions should be applied immediately. If spraying is interrupted, sufficient agitation must be conducted to completely re-suspend any precipitated product.

[illegible]	[illegible]
2,4-D LV Ester 500	309 mL/ac
2,4-D LV Ester 600	283 mL/ac
2,4-D LV Ester 700	243 mL/ac
MCPA Ester 500	388 mL/ac
Pardner EC	400 mL/ac

3. **Crops:** Wheat, spring; durum (Kyle and Plenty).
4. **Weeds Controlled:**

[illegible]

- cleavers
- common chickweed
- foxtail barley
- redroot pigweed
- stinkweed
- volunteer canola (excluding Smart)
- wild mustard
- wild oats

[illegible]

- dandelion
- green smartweed
- kochia
- lady's-thumb
- lamb's-quarters
- narrow-leaved hawk's-beard
- perennial sow-thistle
- stork's-bill
- volunteer Smart canola
- wild buckwheat

[illegible]

- burdock
- cocklebur
- common plantain
- common ragweed
- flixweed
- kochia
- lamb's-quarters
- mustards (except dog/tansy)
- narrow-leaved hawk's-beard
- prickly lettuce
- Russian pigweed
- shepherd's-purse
- stork's-bill
- sunflower
- wild radish

Sundance *(sulfosulfuron)*

Group 2

Manufacturer: **Monsanto Canada Inc.**

WARNING POISON

1. **Formulations:** Water dispersible granule; 75%; 4 x 216 g pouches Sundance + 2 x 8 L Merge.
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Tank mix partner	Tank mix partner rate
2,4-D LV Ester 500	309 mL/ac
2,4-D LV Ester 600	283 mL/ac
2,4-D LV Ester 700	243 mL/ac
MCPA Ester 500	388 mL/ac
Pardner EC	400 mL/ac

3. **Crops:** Wheat, spring: durum (Kyle and Plenty).
4. **Weeds Controlled:**

Sundance 11 g/ac (Alone)

- cleavers
- common chickweed
- foxtail barley
- redroot pigweed
- stinkweed
- volunteer canola (excluding Smart)
- wild mustard
- wild oats

Additional weeds controlled when 2,4-D ester is added

- dandelion
- green smartweed
- kochia
- lady's-thumb
- lamb's-quarters
- narrow-leaved hawk's-beard
- perennial sow-thistle
- stork's-bill
- volunteer Smart canola
- wild buckwheat

Additional weeds controlled when MCPA ester is added

- burdock
- cocklebur
- common plantain
- common ragweed
- flixweed
- kochia
- lamb's-quarters
- mustards (except dog/tansy)
- narrow-leaved hawk's-beard
- prickly lettuce
- Russian pigweed
- shepherd's-purse
- stork's-bill
- sunflower
- wild radish

Sundance (cont'd)

Additional weeds controlled when Pardner EC is added

- American nightshade
- bluebur
- cocklebur
- common groundsel
- common ragweed
- common buckwheat
- cow cockle
- green smartweed
- kochia
- lady's-thumb
- lamb's-quarters
- narrow-leaved hawk's-beard
- pale smartweed
- pigweed
- Russian thistle
- tartary buckwheat
- wild buckwheat

5. **Weeds Suppressed:** Sundance + Merge: Green foxtail, quackgrass, dandelion, perennial sow-thistle. Sundance + MCPA + Merge: Green foxtail, quackgrass, dandelion, perennial sow-thistle, Canada thistle, green smartweed, wild buckwheat.
6. **When Used:**

   Crop Stage: Wheat: Before the fourth tiller.

   Weed Stage: Wild oats: Up to the 6 leaf stage and no later than the 3 tiller stage. For optimum performance and yield response, apply prior to tillering of wild oats. For annual broadleaves, seedling weeds are controlled much easier than larger weeds. Perennial weeds should be treated prior to the flower stage and during a period of active growth.
7. **How to Apply:**

   With: Ground equipment only.

   Rate: Sundance: 11 g/ac + Merge: 202 mL/ac

   Water volume: 23 - 45 L/ac. Always use clean water, free of sediments.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

   Incorporation: Not applicable.
8. **Application Tips:** For optimum control, apply Sundance to actively growing weeds. Early application (prior to the first tiller of wild oats) will maximize crop yields by reducing weed competition. Do not apply Sundance to wheat stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage because crop injury may result.
9. **How it Works:** Sundance is a systemic herbicide that is translocated to the growing points in plants. Sundance inhibits cell division rapidly.
10. **Expected Results:** Growth is inhibited rapidly. Symptoms will be observed in 4 - 5 days. However, complete kill will not be observed until 14 - 25 days after treatment.
11. **Effects of Rainfall:** Rainfall within 2 hours after application may reduce performance.
12. **Movement in Soil:** Movement of this herbicide in soil is minimal.
13. **Grazing and Crop Restrictions:** Sundance-treated fields with soil organic matter of 4% or greater may be rotated to the following crops the year after treatment: all wheat varieties including durum, canola, barley, peas and flax. In fields with areas of high soil pH and low organic matter, injury to crops other than wheat or Smart canola may be observed within the recommended plant-back timing interval. For fields having these conditions, or for any crop not listed above, do not plant for at least 22 months after application. A field bioassay must be conducted the year prior to growing the crop of interest to confirm crop safety.
14. **Toxocity:** Acute oral LD_{50} (rats) (mg/kg) = (>5000).

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store under cool, dry conditions (below 50°C). Do not store under moist conditions.
17. **Resistance Management:** Sundance herbicide is a group 2 herbicide. Any weed population may contain plants naturally resistant to Sundance. Avoid repeated use of Sundance herbicide or other herbicides in the same herbicide group.

Sutan^{+} *(butylate)*

Group 8

Manufacturer: Zeneca Agro

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrate; 800 g/L; 10 L container.
2. **Registered Mixes:** Atrazine, Bladex, dry and liquid fertilizers (urea and urea blends only).

   Mixing restrictions: Check compatibility with fertilizers before tank mixing.
3. **Crops:** Corn (field, silage, sweet).
4. **Weeds Controlled:**

Sutan^{+}	Sutan^{+} + Atrazine	Sutan^{+} + Bladex
barnyard grass	buckwheat, wild	buckwheat, wild
foxtail (green, yellow)	lady's-thumb	lady's-thumb
panicum, fall	lamb's-quarters	lamb's-quarters
	mustards	mustards
	oats, wild	nightshade, black
	pigweed, redroot	purslane
	purslane	ragweed
	ragweed	shepherd's-purse
	smartweed	

5. **Weeds Suppressed:** None.
6. **When Used:** Pre-plant soil incorporated.
7. **How to Apply:**

   With: Ground equipment.

   Rate: 1.7 - 2.2 L/ac. Sandy soils 1.7 L/ac. Clay soils 2.2 L/ac.

   Atrazine mix: 1.7 - 2.2 L/ac Sutan^{+} + (Aatrex Nine-O, Atrazine 90W 506 - 810 g/acre **or** Atrazine 500 810 mL/acre **or** Aatrex Liquid 0.91 - 1.5 L/acre).

   Bladex 80 W or liquid mix: 1.7 - 2.2 L/ac Sutan^{+} + (0.9 - 1.1 kg/ac Bladex 80 W **or** 1.5 - 1.9 L/ac Bladex Liquid.).

   Water volume: 40 L/ac minimum.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

Sundance (cont'd)

Additional weeds controlled when [illegible] is added

- American nightshade
- bluebur
- cocklebur
- common groundsel
- common ragweed
- common buckwheat
- cow cockle
- green smartweed
- kochia
- lady's-thumb
- lamb's-quarters
- narrow-leaved hawk's-beard
- pale smartweed
- pigweed
- Russian thistle
- tartary buckwheat
- wild buckwheat

5. **Weeds Suppressed:** Sundance + Merge: Green foxtail, quackgrass, dandelion, perennial sow-thistle. Sundance + MCPA + Merge: Green foxtail, quackgrass, dandelion, perennial sow-thistle, Canada thistle, green smartweed, wild buckwheat.

6. **When Used:**

   Crop Stage: Wheat: Before the fourth tiller.

   Weed Stage: Wild oats: Up to the 6 leaf stage and no later than the 3 tiller stage. For optimum performance and yield response, apply prior to tillering of wild oats. For annual broadleaves, seedling weeds are controlled much easier than larger weeds. Perennial weeds should be treated prior to the flower stage and during a period of active growth.

7. **How to Apply:**

   With: Ground equipment only.

   Rate: Sundance: 11 g/ac + Merge: 202 mL/ac

   Water volume: 23 - 45 L/ac. Always use clean water, free of sediments.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

   Incorporation: Not applicable.

8. **Application Tips:** For optimum control, apply Sundance to actively growing weeds. Early application (prior to the first tiller of wild oats) will maximize crop yields by reducing weed competition. Do not apply Sundance to wheat stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage because crop injury may result.

9. **How it Works:** Sundance is a systemic herbicide that is translocated to the growing points in plants. Sundance inhibits cell division rapidly.

10. **Expected Results:** Growth is inhibited rapidly. Symptoms will be observed in 4 - 5 days. However, complete kill will not be observed until 14 - 25 days after treatment.

11. **Effects of Rainfall:** Rainfall within 2 hours after application may reduce performance.

12. **Movement in Soil:** Movement of this herbicide in soil is minimal.

13. **Grazing and Crop Restrictions:** Sundance-treated fields with soil organic matter of 4% or greater may be rotated to the following crops the year after treatment: all wheat varieties including durum, canola, barley, peas and flax. In fields with areas of high soil pH and low organic matter, injury to crops other than wheat or Smart canola may be observed within the recommended plant-back timing interval. For fields having these conditions, or for any crop not listed above, do not plant for at least 22 months after application. A field bioassay must be conducted the year prior to growing the crop of interest to confirm crop safety.

14. **Toxocity:** Acute oral LD_{50} (rats) (mg/kg) = (>5000).

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store under cool, dry conditions (below 50°C). Do not store under moist conditions.
17. **Resistance Management:** Sundance herbicide is a group 2 herbicide. Any weed population may contain plants naturally resistant to Sundance. Avoid repeated use of Sundance herbicide or other herbicides in the same herbicide group.

Sutan$^+$ *(butylate)*

Group 8

CAUTION POISON

Manufacturer: **Zeneca Agro**

1. **Formulations:** Emulsifiable Concentrate; 800 g/L; 10 L container.
2. **Registered Mixes:** Atrazine, Bladex, dry and liquid fertilizers (urea and urea blends only).

   Mixing restrictions: Check compatibility with fertilizers before tank mixing.
3. **Crops:** Corn (field, silage, sweet).
4. **Weeds Controlled:**

Sutan$^+$	Sutan$^+$ + Atrazine	Sutan$^+$ + Bladex
barnyard grass	buckwheat, wild	buckwheat, wild
foxtail (green, yellow)	lady's-thumb	lady's-thumb
panicum, fall	lamb's-quarters	lamb's-quarters
	mustards	mustards
	oats, wild	nightshade, black
	pigweed, redroot	purslane
	purslane	ragweed
	ragweed	shepherd's-purse
	smartweed	

5. **Weeds Suppressed:** None.
6. **When Used:** Pre-plant soil incorporated.
7. **How to Apply:**

   With: Ground equipment.

   Rate: 1.7 - 2.2 L/ac. Sandy soils 1.7 L/ac. Clay soils 2.2 L/ac.

   Atrazine mix: 1.7 - 2.2 L/ac Sutan$^+$ + (Aatrex Nine-O, Atrazine 90W 506 - 810 g/acre **or** Atrazine 500 810 mL/acre **or** Aatrex Liquid 0.91 - 1.5 L/acre).

   Bladex 80 W or liquid mix: 1.7 - 2.2 L/ac Sutan$^+$ + (0.9 - 1.1 kg/ac Bladex 80 W **or** 1.5 - 1.9 L/ac Bladex Liquid.).

   Water volume: 40 L/ac minimum.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended.

Sutan$^+$ (cont'd)

Incorporation: Within minutes of application. Use power driven cultivation equipment, set to cut 5 - 7.5 cm deep or disc set 10 - 15 cm. Both types of equipment should operate at 6.9 - 9.5 km/h. Light duty cultivators with tines on 15 - 20 cm centres, set 10 cm deep and operate at 9.5 - 13 km/h. For discs and field cultivators, a second working at right angles to the first will ensure thorough mixing.

8. **Application Tips:** Proper rates, immediate double incorporation (within 1 hour) is very important.
9. **How it Works:** Absorbed by roots and shoots of a germinating weed, disrupts and stops growth causing eventual death of germinating weed.
10. **Expected Results:**

    Weeds: Affected weeds do not emerge; distorted and chlorotic shoots are visible by removing the top layer of treated soil.

    Crops: Sutan$^+$ is safe on crops. Other chemicals, insects or weather may weaken seedlings resulting in crop injury. **Poor results may be expected if** soils are wet, cloddy and trashy; these soil conditions are not suitable for proper application and incorporation.
11. **Effects of Rainfall:** Soluble in water; therefore, excessive moisture may cause some leaching (usually not a problem in Alberta).
12. **Movement in Soil:** Will not move readily.
13. **Grazing and Cropping Restrictions:** No restrictions on grazing, crop use after hail or succeeding crops. Danger from drift is low.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (3,500 - 5,431).
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage not required.

Target *(MCPA + mecoprop + dicamba)*

Group 4

Manufacturer **Novartis Crop Protection Canada Inc.**

CAUTION POISON

1. **Formulations:** Liquid; 275 g/L MCPA + 62.5 g/L mecoprop + 62.5 g/L dicamba; 2 x 10 L pack.
2. **Registered Mixes:** Horizon (95 or 115 mL/ac + Score, wheat). Afolan F (barley, wheat), Lorox L (barley, wheat), Sodium TCA (barley) or Sencor (barley, wheat).
3. **Crops:** Annual canary seed (9.0), barley (8.5), oats (9.0), summer fallow (thistle control), wheat [durum (8.8), hard red spring (8.4), winter (8.6)]. Seedling grasses grown for forage: creeping red fescue, crested wheatgrass, intermediate wheatgrass, meadow foxtail, orchard grass, smooth bromegrass, timothy.
4. **Weeds Controlled:**

buckwheat [tartary (8.5), volunteer, wild (8.5)]
catchfly, night-flowering (7.5)
chickweed*
cleavers (7.5)
cockle, cow (8.5)
flixweed (8.5)
hemp-nettle
knotweed
kochia (8.0)
lady's-thumb
lamb's-quarters (8.7)
mustards [ball, volunteer, wild (8.8), wormseed]
pigweed (prostrate, redroot) (8.5)
ragweed, common
rapeseed, volunteer (9.0)
shepherd's-purse
smartweeds, annual (8.0)
sow-thistle, annual
spurry, corn (8.8)
stinkweed (8.8)
sunflowers, volunteer (8.3)
thistle, Russian (8.5)

* Only in tank mix with Afolan F, Lorox L and Sencor.

5. **Weeds Suppressed:** Canada thistle (6.6), bindweed (field and hedge), sow-thistle (perennial).

6. **When Used:** Annual canary seed, wheat (durum, spring), oats: 2 - 5 leaf stage. Barley: 2 - 4 leaf stage. Winter wheat: apply in spring before crop is more than 30 cm tall seedling grasses grown for forage: 2 - 4 leaf stage. Weed growth stage: 2 - 5 leaf stage. Cleavers (1 - 2 whorl), hemp-nettle (before second pair of true leaves). Russian thistle (less than 5 cm). Summer fallow: Canada thistle is in the early bud stage. Post harvest (stubble): Canada thistle actively growing 15 - 20 cm, do not apply within 2 weeks of a killing frost.

7. **How to Apply:**

   With: Ground or air.

   Rate: 400 - 600 mL/ac. For cleavers, Canada thistle, field bindweed, hedge bindweed, hemp-nettle, sow-thistle (perennial), volunteer canola winter annuals: 600 mL/ac. Summer fallow: 800 mL/ac. Post Harvest (stubble): 800 mL/ac.

   Water volume: Ground: 40 L/ac. Air: 12 L/ac (minimum).

   Pressure: 200 - 300 kPa.

   Nozzles: Flat fan recommended.

8. **Application Tips:** Use the higher rate when weeds are beyond the 3 leaf stage, when weed densities are high, when weeds are not actively growing due to extended periods of hot and dry or cold and wet weather prior to application or for control of overwintering fixweed, shepherd's-purse and stinkweed. In winter wheat, spray winter annuals as soon as growth begins in spring. Do not let contents stand for long periods. Agitate every 8 hours.

9. **How it Works:** A combination of 3 systemic hormonal herbicides that accummulate in the growing point of susceptible plants, produce abnormal growth and disrupt the transport system in plants.

10. **Expected Results:**

    Weeds: Can take up to 7 - 14 days depending on weather and growing conditions. Leaves curl, leaf edges turn brown, petioles twist, plant ceases growth and turns brown and dies.

    Crop: Improper or untimely application can result in abnormal bending at the nodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets. Under certain conditions, straw shortening may occur but yield will not be affected. **Poor results may be expected if** there is poor coverage, rainfall less than 3 hours after application or weeds are too advanced. Dicamba containing products can be hard on crops if incorrectly applied.

11. **Effects of Rainfall:** Rainfall within 3 hours will reduce activity.

12. **Movement in Soil:**

    MCPA/mecoprop: Readily mobile in the soil.

    Dicamba: Relatively mobile; mobility affected by capillary movement and/or surface evaporation. Concentration and location in the soil profile will be determined by total seasonal precipitation, its frequency and original herbicide dosage.

13. **Grazing and Cropping Restrictions:** Do not graze or harvest for livestock feed within 7 days of application. Most vegetables and fruit crops are very sensitive to drift. Cereal and broadleaf crops can be grown the year following application.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = MCPA (100 - 500), mecoprop (930), dicamba (2,629), Target (1,600). Non-toxic to fish. Toxic to bees.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Heated storage only.

M121

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Telar *(chlorsulfuron)*

Group 2

Manufacturer: DuPont Canada Inc.

CAUTION POISON

1. **Formulations:** Dry flowable; 75%, 500 g (5 x 100 gram water soluble bags).
2. **Registered Mixes:** Telar Toss-N-Go (48 g/ac) + Krovar I (2.75 - 3.6 kg/ac + surfactant); Telar Toss-N-Go (6 g/ac) + 2,4-D amine (.32 - .45 L/ac) or 2,4-D ester (.24 - .32 L/ac).

   Surfactants: Agsurf, Agral 90, Citowett plus, Companion.

   Suggested sequentials: Atrazine, Hyvar X, Hyvar XL, Karmex DF, Krovar I, Princep, Spike, or Velpar.

   Mixing instructions: Fill the spray tank 1/4 - 1/3 full with clean water. Add the recommended number of Telar Toss-N-Go bags to the spray tank while agitator is running. Continuous agitation is required to keep Telar herbicide in suspension. After Telar Toss-N-Go Bags have fully dissolved and Telar is in suspension, other tank mix components may be added while continuing to full the tank with water. The proper sequence for tank mix components is as follows:
   1. dry formulations,
   2. emulsifiable concentrates,
   3. surfactants.

   If a drift control agent is to be tank mixed, it is to be added last.

   For repeat loads, reduce the tank heel to 10% or less of the previous load. Fill tank with clean water as described in step 1, and continue as directed. Emulsifiable concentrates may make dispersion of Telar more difficult. For that reason, tank heels of the previous tank mix should be kept to 10% or less of the spray tank volume. Do not allow the spray mixture to remain in the tank for more than 24 hours before spraying, or the effectiveness may be reduced. If the spray mixture has been allowed to stand in the tank, use vigorous agitation to thoroughly disperse before resuming spraying.
3. **Crops:** Non-crop land such as lumber yards, petroleum tank farms, plant sites, railroads and storage areas where the object is to achieve and maintain control of all vegetation.
4. **Weeds Controlled:**

Telar at 6 g/ac + 2,4-D

ball mustard
annual sunflower
common ragweed
cow cockle
flixweed
green smartweed
hemp-nettle
kochia
lady's-thumb
lamb's-quarters
plantain
prickly lettuce
redroot pigweed
Russian pigweed
Russian thistle
shepherd's-purse
stinkweed
stork's-bill
sweet clover
volunteer rapeseed
narrow-leaved hawk's-beard (spring seedlings)

Telar alone at 12 g/ac

blue bur
chickweed
common groundsel
corn spurry
cow cockle
flixweed
green smartweed
hemp-nettle
lady's-thumb
wild mustard
lamb's-quarters
redroot pigweed
scentless chamomile
shepherd's-purse
stinkweed
stork's-bill
volunteer rapeseed
wild mustard

Telar alone at 16 g/ac

Weeds controlled at 12 g/ac, plus
wild carrot

[illegible]

Weeds controlled at 16 g/ac, plus
sweet clover
common tensy
kochia
Russian thistle

Broadleaf weed control in non-crop land (where vegetation is not desirable).

This rate of Telar Toss-N-Go Bags may cause severe injury for certain grass species.

Telar alone at 48 g/ac
Weeds controlled at 28 g/ac, plus
Canada thistle
narrow-leaved hawk's-beard
dandelion
horsetail
wild buckwheat

5. **Weeds Suppressed:**

   Telar (alone) 28 g/ac: Canada thistle, dandelion, horsetail, wild rose, golden rod, perennial sow-thistle, wild strawberry.

   Telar (alone) 48 g/ac: Perennial sow-thistle, golden rod, wild rose, willow, wild strawberry.

6. **When Used:** Apply when weeds are small (less than 10 cm tall). Addition of a recommended surfactant at 1 L/1000 L spray solution may improve control of weeds growing under adverse conditions. Telar Toss-N-Go Bags must be applied within one year of the sequential partner herbicide, or otherwise the sequential partner must follow Telar application within 1 year. Do not apply to frozen ground or to soils saturated with water or during periods of heavy rainfall. Do not apply Telar herbicide more often than once every 3 years. Do not make consecutive applications of Telar without alternating with a sequential partner herbicide. These precautions are necessary to prevent selection of weed biotypes resistant to Telar.

7. **How to Apply:**

   With: Ground equipment. Do **not** apply by air.

   Rate: Alone at 12, 16, 28 or 48 g/ac. At 6 g/ac when tank mixing with 2,4-D and at 28 g/ac when tank mixing with Krovar I.

   Surfactant: 1 L/1000 L spray solution.

   Water volume: Not less than 40 L/ac. Spray volumes of 80 - 160 L/ac are recommended.

   Pressure: 275 kPa.

   Nozzles: 50 mesh or larger screens. Only metal or nylon filters.

   Sprayer cleanup: If the sprayer is to be used to spray sensitive crops or ornamentals, thoroughly remove all traces of Telar herbicide from the mixing and spray equipment immediately after spraying as follows:

   1. Drain and flush tank, boom and hoses with clean water for a minimum of ten minutes. Visually inspect tank to assure removal of all visible residues of Telar herbicide. If necessary, repeat step 1. Do not clean sprayer near well or water source or near desirable vegetation.
   2. Fill the tank with clean water while adding 1 litre household ammonia (containing a minimum 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, and then add more water to completely fill tank. Allow to sit for 15 minutes with agitation. Again, flush the hoses, boom and nozzles with the cleaning solution and drain tank.
   3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
   4. Repeat step 2.
   5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** Select a spray volume that will ensure thorough coverage and uniform spray pattern. Best results are obtained when weeds are actively growing.

9. **How it Works:** Absorbed through the roots and foliage. Inhibits cell elongation.

10. **Expected Results:** Telar rapidly inhibits growth of susceptible weeds. Typical symptoms (discoloration) of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on the following factors: rate used, weed sensitivity and weed size, growing conditions at and following treatment, precipitation, soil organic matter and pH.

Telar *(chlorsulfuron)*

Group 2

Manufacturer: DuPont Canada Inc.

CAUTION POISON

1. **Formulations:** Dry flowable; 75%. 500 g (5 x 100 gram water soluble bags).
2. **Registered Mixes:** Telar Toss-N-Go (48 g/ac) + Krovar I (2.75 - 3.6 kg/ac + surfactant); Telar Toss-N-Go (6 g/ac) + 2.4-D amine (.32 - .45 L/ac) or 2,4-D ester (.24 - .32 L/ac).

   Surfactants: Agsurf, Agral 90, Citowett plus, Companion.

   Suggested sequentials: Atrazine, Hyvar X, Hyvar XL, Karmex DF, Krovar I, Princep, Spike, or Velpar.

   Mixing instructions: Fill the spray tank 1/4 - 1/3 full with clean water. Add the recommended number of Telar Toss-N-Go bags to the spray tank while agitator is running. Continuous agitation is required to keep Telar herbicide in suspension. After Telar Toss-N-Go Bags have fully dissolved and Telar is in suspension, other tank mix components may be added while continuing to full the tank with water. The proper sequence for tank mix components is as follows:
   1. dry formulations,
   2. emulsifiable concentrates,
   3. surfactants.

   If a drift control agent is to be tank mixed, it is to be added last.

   For repeat loads, reduce the tank heel to 10% or less of the previous load. Fill tank with clean water as described in step 1, and continue as directed. Emulsifiable concentrates may make dispersion of Telar more difficult. For that reason, tank heels of the previous tank mix should be kept to 10% or less of the spray tank volume. Do not allow the spray mixture to remain in the tank for more than 24 hours before spraying, or the effectiveness may be reduced. If the spray mixture has been allowed to stand in the tank, use vigorous agitation to thoroughly disperse before resuming spraying.
3. **Crops:** Non-crop land such as lumber yards, petroleum tank farms, plant sites, railroads and storage areas where the object is to achieve and maintain control of all vegetation.
4. **Weeds Controlled:**

Telar at 6 g/ac + 2,4-D

ball mustard
annual sunflower
common ragweed
cow cockle
flixweed
green smartweed
hemp-nettle
kochia
lady's-thumb
lamb's-quarters
plantain
prickly lettuce
redroot pigweed
Russian pigweed
Russian thistle
shepherd's-purse
stinkweed
stork's-bill
sweet clover
volunteer rapeseed
narrow-leaved hawk's-beard (spring seedlings)

Telar alone at 12 g/ac

blue bur
chickweed
common groundsel
corn spurry
cow cockle
flixweed
green smartweed
hemp-nettle
lady's-thumb
wild mustard
lamb's-quarters
redroot pigweed
scentless chamomile
shepherd's-purse
stinkweed
stork's-bill
volunteer rapeseed
wild mustard

Telar alone at 16 g/ac

Weeds controlled at 12 g/ac, plus
wild carrot

Telar alone at 28 g/ac

Weeds controlled at 16 g/ac, plus
sweet clover
common tansy
kochia
Russian thistle

Broadleaf weed control in non-crop land (where vegetation is not desirable).

This rate of Telar Toss-N-Go Bags may cause severe injury for certain grass species.

Telar alone at 48 g/ac

Weeds controlled at 28 g/ac, plus
Canada thistle
narrow-leaved hawk's-beard
dandelion
horsetail
wild buckwheat

5. **Weeds Suppressed:**

   Telar (alone) 28 g/ac: Canada thistle, dandelion, horsetail, wild rose, golden rod, perennial sow-thistle, wild strawberry.

   Telar (alone) 48 g/ac: Perennial sow-thistle, golden rod, wild rose, willow, wild strawberry.

6. **When Used:** Apply when weeds are small (less than 10 cm tall). Addition of a recommended surfactant at 1 L/1000 L spray solution may improve control of weeds growing under adverse conditions. Telar Toss-N-Go Bags must be applied within one year of the sequential partner herbicide, or otherwise the sequential partner must follow Telar application within 1 year. Do not apply to frozen ground or to soils saturated with water or during periods of heavy rainfall. Do not apply Telar herbicide more often than once every 3 years. Do not make consecutive applications of Telar without alternating with a sequential partner herbicide. These precautions are necessary to prevent selection of weed biotypes resistant to Telar.

7. **How to Apply:**

   With: Ground equipment. Do **not** apply by air.

   Rate: Alone at 12, 16, 28 or 48 g/ac. At 6 g/ac when tank mixing with 2,4-D and at 28 g/ac when tank mixing with Krovar I.

   Surfactant: 1 L/1000 L spray solution.

   Water volume: Not less than 40 L/ac. Spray volumes of 80 - 160 L/ac are recommended.

   Pressure: 275 kPa.

   Nozzles: 50 mesh or larger screens. Only metal or nylon filters.

   Sprayer cleanup: If the sprayer is to be used to spray sensitive crops or ornamentals, thoroughly remove all traces of Telar herbicide from the mixing and spray equipment immediately after spraying as follows:

   1. Drain and flush tank, boom and hoses with clean water for a minimum of ten minutes. Visually inspect tank to assure removal of all visible residues of Telar herbicide. If necessary, repeat step 1. Do not clean sprayer near well or water source or near desirable vegetation.
   2. Fill the tank with clean water while adding 1 litre household ammonia (containing a minimum 3% ammonia) per 100 litres of water. Flush solution through boom and hoses, and then add more water to completely fill tank. Allow to sit for 15 minutes with agitation. Again, flush the hoses, boom and nozzles with the cleaning solution and drain tank.
   3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
   4. Repeat step 2.
   5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** Select a spray volume that will ensure thorough coverage and uniform spray pattern. Best results are obtained when weeds are actively growing.

9. **How it Works:** Absorbed through the roots and foliage. Inhibits cell elongation.

10. **Expected Results:** Telar rapidly inhibits growth of susceptible weeds. Typical symptoms (discoloration) of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on the following factors: rate used, weed sensitivity and weed size, growing conditions at and following treatment, precipitation, soil organic matter and pH.

Telar (cont'd)

11. **Effects of Rainfall:** Rainfall within 2 hours may lessen degree of weed control. Residual control of weeds germinating after spray application as achieved when Telar herbicide is carried into the root zone by rainfall. For best results, sufficient rainfall to move Telar 5 - 7 cm deep into the soil is required after application, before weeds develop an established root system and grow beyond the seedling stage.
12. **Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral-to-acidic conditions.
13. **Grazing and Cropping Restrictions:** For use on non-crop land only.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (5,919).
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 23) for further information. Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place. Telar Toss-N-Go Bags are dry flowable granules contained within a water soluble film. The water soluble film dissolves readily in water. Reseal unused Toss-N-Go Bags into cardboard cylinder when not in use.
17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Escort, Express, Muster, Refine Extra, the DF component of Laser DF, the Plus component of Champion Plus, Triumph Plus and Telar. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Escort, Express, Laser DF, Muster, Refine Extra, Refine W.O., Telar and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

Thumper *(bromoxynil + 2,4-D)*

Group 4,6

Manufacturer **Aventis Crop Science**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; 280 g/L bromoxynil + 280 g/L 2,4-D; 2 x 8 L jugs.
2. **Registered Mixes:** Achieve 80DG (wheat, barley); Avenge (barley, spring wheat); Horizon (spring wheat, durum wheat); Puma Super (spring wheat, durum wheat). Refer to Achieve 80DG label for mixing instructions.
3. **Crops:**

barley
wheat (spring, durum)

4. **Weeds Controlled:**

bluebur
buckwheat [common, tartary, wild]
catchfly, night-flowering
cockle, cow
cocklebur
flixweed
groundsel, common
kochia
lady's-thumb
lamb's-quarters
mustard [ball, wild]
nightshade, American
pigweed [redroot, triazine resistant]
ragweed, common
shepherd's-purse
smartweed [green, pale]
stinkweed
sunflower, volunteer
thistle, Russian
volunteer canola

5. **Weeds Suppressed:** None.
6. **When Used:**

Cereals: 4 leaf to early flag leaf.

Weeds: Up to 4 leaf stage. Buckwheats, groundsel, lamb's-quarters, mustard (wild), stinkweed up to 8 leaf stage. Kochia, Russian thistle up to 5 cm high. Velvet leaf up to 8 cm high.

7. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate: 405 mL/ac.

   Water volume: Air: 8 L/ac or more. Ground: 20 - 40 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan recommended. Hollow cone (air only).

8. **Application Tips:** Do not treat cereals underseeded with forages. For best results, spray when weeds are in the seedling stage and actively growing. Application before the 4 leaf stage may injure the crop.
9. **How it Works:** Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. 2,4-D is a hormone type herbicide which causes abnormal growth, affects respiration, food reserves and cell division in broadleaf plants. Absorbed primarily by leaves and stems and translocated to the growing tips and roots.
10. **Expected Results:** Small burn spots on the leaf can appear within hours; death takes up to 2 weeks.
11. **Effects of Rainfall:** No effect.
12. **Movement in Soil:** Leaching does not pose a problem.
13. **Grazing and Cropping Restrictions:** Do not graze of harvest for greenfeed until 30 days after treatment.

    Succeeding crops: No restrictions.

14. **Toxicology:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 230 (active ingredient). Intake of a large dose may cause convulsions, sudden collapse and coma. Can be absorbed through the skin. Very toxic to fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Does not require heated storage.

Tordon 22K *(picloram)*
Tordon 101 Mixture

(picloram + 2,4-D) (Industrial)
Available only to authorized pesticide applicators

Manufacturer **Dow AgroSciences Canada Inc.**

CAUTION POISON

1. **Formulations:** Solution: Tordon 22K; 240 g/L; 10 L jug: Tordon 101 Mixture; 65 g + 240 g/L; 10 L.
2. **Registered Mixes:** Tordon 101 plus Sodium TCA, Tordon 101 plus Sylgard.
3. **Crops:**

   Tordon 22K: Permanent grass pastures, rangeland, spot treatment on cultivated cropland, utility rights-of-way.

   Tordon 101 mixture: Non-crop areas (utility rights-of-way).

M121

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Tordon 22K, Tordon 101 Mixture (cont'd)

4. **Weeds Controlled:**

Tordon 22K:

Group 1: Scentless chamomile.

Group 2: Knapweed (diffuse, spotted).

Group 3: Canada thistle, pasture sage, poverty weed, Russian knapweed, sow-thistle.

Group 4: Field bindweed, leafy spurge, toadflax.

Tordon 101 mixture:

Brush: Alder, birch, cedar, maple, pine, poplar, spruce and other species.

Weeds: Burdock, Canada thistle, clover (red, sweet), common ragweed, dandelion, dock, goldenrod, fleabane, plantain, prickly lettuce, vetch, wild carrot.

5. **Weeds Suppressed:** None.

6. **When Used:**

Tordon 22K: Any time when fully developed, green leaves are present.

Tordon 101 mixture:

Brush: After foliage is well developed. Unsatisfactory results may occur if applications are made when foliage has lost its normal green color.

Weeds: Spring or early summer after growth appears.

7. **How to Apply:**

With:

Tordon 22K: Boom, handgun or backpack.

Tordon 101 mixture: Ground equipment or helicopter using drift control system or agent.

Rate:

Tordon 22K	Tordon 22K per 100m^2
Group 1: 445 mL/ac	**Group 1:** 11 mL
Group 2: 910 mL/ac	**Group 2:** 22 mL
Group 3: 1.8 L/ac	**Group 3:** 45 mL
Group 4: 3.6 L/ac	**Group 4:** 90 mL
Tordon 101 mixture	
Brush: 7.3 - 10 L/ac (ground); 10 - 14 L/ac (air).	
Weeds: 2.8 L/ac.	

Water volume:

Tordon 22K: 160 - 324 L/ac.

Tordon 101 mixture: 80 L/ac.

Nozzles: Flat fan recommended.

8. **Application Tips:** Tordon 22K used as a spot treatment in a crop. No spot treatment should exceed 1 acre, and the total area treated in any 1 field in a year should not exceed 5% of the field.

Note: Picloram is extremely persistent and water soluble. Small quantities may cause damage to desirable plants. Do not apply or permit any Tordon to contaminate soil used to grow desirable, susceptible plants. Do not contaminate water used for irrigation or domestic purposes.

9. **How it Works:** Interferes with cell division, causing leaf cupping, stem distortion and eventual death of plant. Tordon 101 and 22K are absorbed through leaves and roots.

Tordon 22K, Tordon 101 Mixture (cont'd)

4. **Weeds Controlled:**

Tordon 22K:

Group 1: Scentless chamomile.

Group 2: Knapweed (diffuse, spotted).

Group 3: Canada thistle, pasture sage, poverty weed, Russian knapweed, sow-thistle.

Group 4: Field bindweed, leafy spurge, toadflax.

Tordon 101 mixture:

Brush: Alder, birch, cedar, maple, pine, poplar, spruce and other species.

Weeds: Burdock, Canada thistle, clover (red, sweet), common ragweed, dandelion, dock, goldenrod, fleabane, plantain, prickly lettuce, vetch, wild carrot.

5. **Weeds Suppressed:** None.

6. **When Used:**

Tordon 22K: Any time when fully developed, green leaves are present.

Tordon 101 mixture:

Brush: After foliage is well developed. Unsatisfactory results may occur if applications are made when foliage has lost its normal green color.

Weeds: Spring or early summer after growth appears.

7. **How to Apply:**

With:

Tordon 22K: Boom, handgun or backpack.

Tordon 101 mixture: Ground equipment or helicopter using drift control system or agent.

Rate:

Tordon 22K	**Tordon 22K per 100m^2**
Group 1: 445 mL/ac	**Group 1: 11 mL**
Group 2: 910 mL/ac	**Group 2: 22 mL**
Group 3: 1.8 L/ac	**Group 3: 45 mL**
Group 4: 3.6 L/ac	**Group 4: 90 mL**

Tordon 101 mixture

Brush: 7.3 - 10 L/ac (ground); 10 - 14 L/ac (air).

Weeds: 2.8 L/ac.

Water volume:

Tordon 22K: 160 - 324 L/ac.

Tordon 101 mixture: 80 L/ac.

Nozzles: Flat fan recommended.

8. **Application Tips:** Tordon 22K used as a spot treatment in a crop. No spot treatment should exceed 1 acre, and the total area treated in any 1 field in a year should not exceed 5% of the field.

Note: Picloram is extremely persistent and water soluble. Small quantities may cause damage to desirable plants. Do not apply or permit any Tordon to contaminate soil used to grow desirable, susceptible plants. Do not contaminate water used for irrigation or domestic purposes.

9. **How it Works:** Interferes with cell division, causing leaf cupping, stem distortion and eventual death of plant. Tordon 101 and 22K are absorbed through leaves and roots.

10. **Expected Results:**

    Tordon 22K: Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually native grass increases in abundance as a result of reduced competition.

    Tordon 101 mixture: 2 - 3 weeks after the first rainfall after treatment, leaves of affected trees become dull and cupped; orange streaks appear on stems of poplar trees and leaves become brown and brittle as the tree dies. **Poor results may be expected if** there is heavy rainfall immediately after treatment on light sandy soil.

11. **Effects of Rainfall:** Heavy rainfall may dissolve and carry picloram away from the target area, or it may percolate dissolved picloram out of the root zone of target plants.

12. **Movement in Soil:** Picloram is very soluble in water and moves with water in coarsely textured soils.

13. **Grazing and Cropping Restrictions:** Do not graze dairy animals in treated area within 6 weeks after treatment. For Tordon 101, withdraw meat animals from treated fields 3 days prior to slaughter. Manure from picloram treated vegetation should not be used to grow sensitive crops but rather be returned to a cereal crop field. When applied as a spot treatment on cropland, picloram may persist in soil for up to 5 years and prevent the establishment of sensitive crops.

    Succeeding crops:

    1st year: Oats.

    2nd year: Oats or barley.

    3rd year: Oats, barley or wheat. A reduction in yield in the 1st year is usually offset by benefits of weed control obtained. Legumes may not be established in a pasture for several years after a Tordon treatment. If legumes are essential in a pasture, do not use Tordon.

14. **Toxicity:** Low (22K) or moderate (101 Mixture) acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical Picloram (8,200); Tordon 22K (10,330); Tordon 101 Mixture (3,080).

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Tordon 22K: Store in a cool, dry place. Do not freeze. If freezing occurs, bring to room temperature and mix thoroughly. Tordon 101 Mixture: Store in a cool, dry place.

Touchdown 480/ Touchdown XP *(glyphosate)*

Group 9

Manufacturer **Zeneca Agro**

WARNING POISON

1. **Formulations:**
   Touchdown 480: Water soluble liquid; 330 g/L acid equivalent (present as 480 g/L trimethylsulfonium salt); 10 L jugs.
   Touchdown XP: Water soluble liquid; 440 g/L acid equivalent (present as XP g/L trimethylsulfonium salt).

2. **Registered Mixes:** Chemical fallow: Banvel, (or 2,4-D amine) + non-ionic surfactant.

   Non-ionic surfactants: Rely, Agral 90, Ag-Surf, Frigate, Companion, Enhance. Touchdown XP does not contain an adjuvant; therefore, one must be added to the spray mixture. Refer to *How to Apply* section.

3. **Crops:** Preplant or preseed application in direct seeding systems, fall stubble treatment, spot treatment (in-crop), non-crop areas, minimum or zero tillage, pasture renovation, summer fallow.

Touchdown 480/Touchdown XP (cont'd)

4. Weeds Controlled:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
annual bluegrass	chickweed, common	prostrate knotweed	bluegrass (Canada Kentucky)	alfalfa	milkweed, common
barnyard grass	dodder	redroot pigweed	bromegrass, smooth	chickweed, mouse-eared	plantain, broadleaf
downy brome	fleabane (Canada)	Russian thistle	foxtail barley	clover, white	round-leafed mallow
giant foxtail	flixweed	shepherd's-purse	orchard grass	colt's foot	sheep's sorrel
green foxtail	hairy galinsoga	sow-thistle (annual)	redtop, common	cress, hoary	smooth bedstraw
Persian darnel	hemp-nettle	stinkweed	wirestem mulhy	cattail	sow-thistle
rye grass, tame	kochia	stork's-bill		dandelion, common	stichwort, grass-leaved
volunteer barley	lady's-thumb	volunteer canola		dock, curled	thistle, Canada
volunteer wheat	lamb's-quarters	volunteer corn		field bindweed	wild carrot
wild oats	low cudweed	volunteer flax		goldenrod, Canada	wild grape
yellow foxtail	nightshade, black	wild buckwheat		horsetail	wormwood
	narrow-leafed hawk's-beard	wild mustard		Jerusalem artichoke	

5. Weeds Suppressed: None.

6. When Used:

Annual weeds: Grassy and broadleaf weeds at least 15 cm tall and actively growing.

Perennial weeds:

Canada thistle (bud stage): At or beyond bud stage of growth.

Canada thistle (rosette stage): Ensure the majority of the rosettes are a minimum of 15 cm in diameter.

Field bindweed: At or beyond full bloom stage.

Milkweed: Bud to full bloom for most shoots.

Quackgrass (spring application, no fall tillage): 3 - 4 green leaves or approximately 20 cm in height.

Quackgrass (spring application, fall-tilled land): 4 - 5 green leaves or approximately 20 cm in height.

Quackgrass (fall application, after harvest): 3 - 4 green leaves or approximately 20 cm in height.

Other perennial weeds: At the early heading or early bud stage.

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7. How to Apply:

With: Ground equipment only. Boom (ground boom) and boomless equipment, knapsack sprayers, hand held and high volume equipment; wiper, wick and roller equipment.

Rate:

Weed	Timing	Stage	TD 480 Rate (L/ac)	TD XP Rate (L/ac)	Level of Infestation	Notes/Tips
Annual Weeds: wild oats, green foxtail, volunteer cereals, canola, wild mustard, lady's thumb, stinkweed.	Fallow use	weeds up to 8 cm in height	0.35	0.26	light to moderate	Apply to wild oats at 1 - 3 leaf stage. Extra surfactant required such as Agral 90 or Agsurf. For heavy wild oat infestations, use higher rate.
All annual grasses listed above plus foxtail barley, downey brome, giant foxtail, and Persian darnel. All annual broadleaved weeds listed above plus flixweed, kochia, lamb's-quarters, redroot pigweed, hempnettle, flixweed, Russian thistle, volunteer flax, common ragweed Canada fleabane*, wild buckwheat**, narrow-leaved hawk's-beard***.		weeds up to 15 cm in height	0.5 - 0.75	0.375 - 0.56	light to moderate	No additional surfactant required. For tank mix weed control, see tank mix chart. * Do not use these rates on weedsgreater than 8 cm in height. ** For3 - 4 leaf stage use 0.76L/ac rate. *** For weeds 8 - 15 cm in height use 0.76L/ac rate.
All annual grasses listed above plus crab grass and annual blue grass. All annual broadleaved weeds listed above plus kochia, prickly lettuce, shepherd's-purse, annual sow-thistle, and narrow-leaved vetch.		weeds up to 15 cm in height	0.9 L/ac	0.675 L/ac	light to moderate	For additional annual broadleaved weed control options, refer to tank mix options.
All annual grasses and broadleaved weeds listed above		weeds over 15 cm in height	1.4 L/ac	1.05 L/ac	light to moderate	For additional annual broadleaved weed control options, refer to tank mix options.

4. **Weeds Controlled:**

Annuals			Perennials		
Grasses	**Broadleaf**		**Grasses**	**Broadleaf**	
annual bluegrass	chickweed, common	prostrate knotweed	bluegrass (Canada Kentucky)	alfalfa	milkweed, common
barnyard grass	dodder	redroot pigweed	bromegrass, smooth	chickweed, mouse-eared	plantain, broadleaf
downy brome	fleabane (Canada)	Russian thistle	foxtail barley	clover, white	round-leafed mallow
giant foxtail	flixweed	shepherd's-purse	orchard grass	colt's foot	sheep's sorrel
green foxtail	hairy galinsoga	sow-thistle (annual)	redtop, common	cress, hoary	smooth bedstraw
Persian darnel	hemp-nettle	stinkweed	wirestem mulhy	cattail	sow thistle
rye grass, tame	kochia	stork's-bill		dandelion, common	stichwort, grass-leaved
volunteer barley	lady's-thumb	volunteer canola		dock, curled	thistle, Canada
volunteer wheat	lamb's-quarters	volunteer corn		field bindweed	wild carrot
wild oats	low cudweed	volunteer flax		goldenrod, Canada	wild grape
yellow foxtail	nightshade, black	wild buckwheat		horsetail	wormwood
	narrow-leafed hawk's-beard	wild mustard		Jerusalem artichoke	

5. **Weeds Suppressed:** None.

6. **When Used:**

Annual weeds: Grassy and broadleaf weeds at least 15 cm tall and actively growing.

Perennial weeds:

Canada thistle (bud stage): At or beyond bud stage of growth.

Canada thistle (rosette stage): Ensure the majority of the rosettes are a minimum of 15 cm in diameter.

Field bindweed: At or beyond full bloom stage.

Milkweed: Bud to full bloom for most shoots.

Quackgrass (spring application, no fall tillage): 3 - 4 green leaves or approximately 20 cm in height.

Quackgrass (spring application, fall-tilled land): 4 - 5 green leaves or approximately 20 cm in height.

Quackgrass (fall application, after harvest): 3 - 4 green leaves or approximately 20 cm in height.

Other perennial weeds: At the early heading or early bud stage.

7. How to Apply:

With: Ground equipment only. Boom (ground boom) and boomless equipment, knapsack sprayers, hand held and high volume equipment; wiper, wick and roller equipment.

Rate:

Weed	Timing	Stage	TD 480 Rate (L/ac)	TD XP Rate (L/ac)	Level of Infestation	Notes/Tips
Annual Weeds: wild oats, green foxtail, volunteer cereals, canola, wild mustard, lady's thumb, stinkweed.	Fallow use	weeds up to 8 cm in height	0.35	0.26	light to moderate	Apply to wild oats at 1 - 3 leaf stage. Extra surfactant required such as Agral 90 or Agsurf. For heavy wild oat infestations, use higher rate.
All annual grasses listed above plus foxtail barley, downey brome, giant foxtail, and Persian darnel. All annual broadleaved weeds listed above plus flixweed, kochia, lamb's-quarters, redroot pigweed, hempnettle, flixweed, Russian thistle, volunteer flax, common ragweed Canada fleabane*, wild buckwheat**, narrow-leaved hawk's-beard***.		weeds up to 15 cm in height	0.5 - 0.75	0.375 - 0.56	light to moderate	No additional surfactant required. For tank mix weed control, see tank mix chart. * Do not use these rates on weedsgreater than 8 cm in height. ** For3 - 4 leaf stage use 0.76L/ac rate. *** For weeds 8 - 15 cm in height use 0.76L/ac rate.
All annual grasses listed above plus crab grass and annual blue grass. All annual broadleaved weeds listed above plus kochia, prickly lettuce, shepherd's-purse, annual sow-thistle, and narrow-leaved vetch.		weeds up to 15 cm in height	0.9 L/ac	0.675 L/ac	light to moderate	For additional annual broadleaved weed control options, refer to tank mix options.
All annual grasses and broadleaved weeds listed above		weeds over 15 cm in height	1.4 L/ac	1.05 L/ac	light to moderate	For additional annual broadleaved weed control options, refer to tank mix options.

Touchdown 480/Touchdown XP (cont'd)

Weed	Timing	Stage	TD 480 Rate (L/ac)	TD XP Rate (L/ac)	Level of Infestation	Notes/Tips
Perennial Weeds						
Quackgrass	Spring	For all timing: 3 - 5 leaves and actively growing	0.5 - 1.0 1.0 - 1.5 1.0 - 2.8	0.375 0.75 - 1.1 0.75 - 2.1	Light - Moderate Light - Moderate Heavy	Wait minimum of 3 days to tillage
	Fallow	4 - 5 leaves and 6 weeks of growth	1.0 - 2.0 2	0.75 - 1.5 1.5	Light - Moderate Heavy	Wait minimum of 3 days to tillage. Tank mix options with Banvel, 2,4-D amine or Pardner
	Pre- Harvest		1	0.75	All levels	Wait 3 days to swath, 7 - 10 days to combine
	Post- Harvest		1.0 - 2.0	0.75 - 1.5	All levels	Apply 3 - 4 weeks after swathing to allow 3 - 4 actively growing leaves. Need at least 60% green growth after frost. Wait 3 days after application before tilling. Tank mix options with Banvel , 2,4-D amine or Partner.
Canada thistle	Spring		1	0.75		Usually not present before seeding. Suppression.
	Fallow	15 cm in diameter and 5 weeks growth	1.0 - 2.0	0.75 - 1.5	All levels	Till until July15 - Aug 1. Spray in rosette stage and minimum 6" in diameter. Wait 10 days to till. Tank mix option with Banvel , 2,4-D amine or Pardner.
	Pre-Harvest	Bud Stage	1	0.75	All levels	Wait 3 days to swath, 7 - 10 days before combining
	Post-Harvest	Actively growing	1.0 - 2.0	0.75 - 1.5	All levels	Need green actively growing leaves. Watch frost. Tank mix options with Banvel , 2,4-D amine or Pardner.
Perennial Sow-thistle	Spring	Actively growing	0.75 - 0.85 + 6 - 8 oz. LV700	0.56 - 0.63 + 6 - 8 oz. LV700	All levels	Usually not present before seeding Suppression.
	Spring	Actively growing	1	0.75	All levels	
	Fallow	15 cm diameter	1.0 - 2.0	0.75	All levels	Same as Canada thistle recommendations. Tank mix options with Banvel, 2,4-D amine or Pardner.
	Pre-Harvest	Actively growing, at bud to bloom stage	1	0.75	All levels	If heavy crop canopy use 7 - 10 gpa water volume
	Post-Harvest		1	0.75		Tank mix options with Banvel , 2,4-D amine or Pardner.

Note: The following grasses and broadleaved weeds require a use rate of 0.9 L/ac - 1.8 L/ac. Wire stemmed mulhy, alfalfa, broadleaved plantain, Canada goldenrod, horsetail, mouse-eared chickweed, sheep's sorrel and wild grape.

All other perennial grasses and broadleaved weeds require use rate of 1.8 L/ac - 2.8 L/ac. These include: common redtop, orchard grass, colt's foot dandelion, grass-leafed stitchwort, Jerusalem artichoke, round-leaved mallow, smooth bedstraw, stork's-bill, white clover and wild carrot.

Adjuvants:
Touchdown XP (only):

Adjuvent	Type	All uses	For longer term Quackgrass control
Rely	cationic	0.5% v/v or 500 mL/100 L of spray solution	
Frigate	cationic		1.0% v/v or 1.0 L/100 L of spray solution
Enhance	cationic		use 200 mL/acre where quackgrass rate is stated as 0.8 L/acre

Minimum or zero tillage: 445 mL + 140 mL/acre non-ionic surfactant.

Reduced rates (summer fallow): 300 - 400 mL + 140 mL/acre non-ionic surfactant.

Preplant of preseed application in direct seeding systems: 300 - 900 mL/acre annual weeds up to 15 cm in height. Apply prior to seeding or after seeding but before crop emergence for control of emerged weeds in direct seeding systems. Ensure weeds are at the desired stage at time of application. This product does not provide pre-emergent weed control, and newly germinating weeds may be a problem in the crop.

Water volume: Handgun, high volume (coarse spray only): 80 - 120 L/acre. Boom: 40 - 120 L/acre. Chemical fallow, reduced rates: 20 - 40 L/acre.

Pressure: 275 kPa.

Nozzles: Flat fan nozzles for volumes 20 - 40 L/acre: flood jet type or flat fan for volumes above 40 L/acre.

8. **Application Tips:** Tillage or mowing prior to application will reduce effectiveness on perennial weeds. Minimum (days) to wait before tillage after Touchdown applications: quackgrass (5); Canada thistle bud stage (5); Canada thistle rosette stage (10); field bindweed, milkweed, other perennials (7). Reduced results may occur if water containing soil is used, such as water from ponds and ditches. Poor control may also occur when treating weeds heavily covered with dust.

   Quackgrass control: Spring and fall treatments in annual and forage cropping systems: Apply to actively growing quackgrass. Reduced control may result if rhizomes become dormant. This may occur due to poor sod or land has not been tilled for several years. For fall application, straw should be removed or evenly spread to allow regrowth and adequate spray coverage. Treatment after a mild frost is possible if 3 - 4 leaves are still green and actively growing but not after a heavy frost. For spring application on fall tilled ground, delay application until majority of quackgrass have 4 - 5 green leaves. This stage is usually reached 1 - 4 weeks later than undisturbed ground.

   Canada thistle (fall rosette): Conduct summer fallow tillage as usual and perform the last tillage operation from July 5 to August 1. Allow thistles to regrow for a minimum of 5 weeks until they are 15 cm in diameter and majority of them in a rosette stage. Treatment after mild frost is possible if leaves are still green and actively growing but not after heavy damaging frost.

9. **How it Works:** A non-selective, systemic herbicide that moves from the foliage into the roots and kills the entire plant.

10. **Expected Results:** Gradual wilting and yellowing of the plant that advances to complete browning of above ground growth, and deterioration of underground plant parts occurs. For annuals, this occurs within 2 - 4 days; perennials require 7 - 10 days. Extremely cool and cloudy weather may slow activity of this product and delay visual effects of control.

11. **Effects of Rainfall:** Do not apply if rainfall is forecast for the time of application.

12. **Movement in Soil:** The amount of glyphosate leaching is very low.

Note: The following grasses and broadleaved weeds require a use rate of 0.9 L/ac - 1.8 L/ac. Wire stemmed mulhy, alfalfa, broadleaved plantain, Canada goldenrod, horsetail, mouse-eared chickweed, sheep's sorrel and wild grape.
All other perennial grasses and broadleaved weeds require use rate of 1.8 L/ac - 2.8 L/ac. These include: common redtop, orchard grass, colt's foot dandelion, grass-leafed stitchwort, Jerusalem artichoke, round-leaved mallow, smooth bedstraw, stork's-bill, white clover and wild carrot.

Adjuvants:
Touchdown XP (only):

Adjuvant	Type	All uses	For longer term Quackgrass control
Rely	cationic	0.5% v/v or 500 mL/100 L of spray solution	
Frigate	cationic		1.0% v/v or 1.0 L/100 L of spray solution
Enhance	cationic		use 200 mL/acre where quackgrass rate is stated as 0.8 L/acre

Minimum or zero tillage: 445 mL + 140 mL/acre non-ionic surfactant.

Reduced rates (summer fallow): 300 - 400 mL + 140 mL/acre non-ionic surfactant.

Preplant of preseed application in direct seeding systems: 300 - 900 mL/acre annual weeds up to 15 cm in height. Apply prior to seeding or after seeding but before crop emergence for control of emerged weeds in direct seeding systems. Ensure weeds are at the desired stage at time of application. This product does not provide pre-emergent weed control, and newly germinating weeds may be a problem in the crop.

Water volume: Handgun, high volume (coarse spray only): 80 - 120 L/acre. Boom: 40 - 120 L/acre. Chemical fallow, reduced rates: 20 - 40 L/acre.

Pressure: 275 kPa.

Nozzles: Flat fan nozzles for volumes 20 - 40 L/acre: flood jet type or flat fan for volumes above 40 L/acre.

8. **Application Tips:** Tillage or mowing prior to application will reduce effectiveness on perennial weeds. Minimum (days) to wait before tillage after Touchdown applications: quackgrass (5); Canada thistle bud stage (5); Canada thistle rosette stage (10); field bindweed, milkweed, other perennials (7). Reduced results may occur if water containing soil is used, such as water from ponds and ditches. Poor control may also occur when treating weeds heavily covered with dust.

   Quackgrass control: Spring and fall treatments in annual and forage cropping systems: Apply to actively growing quackgrass. Reduced control may result if rhizomes become dormant. This may occur due to poor sod or land has not been tilled for several years. For fall application, straw should be removed or evenly spread to allow regrowth and adequate spray coverage. Treatment after a mild frost is possible if 3 - 4 leaves are still green and actively growing but not after a heavy frost. For spring application on fall tilled ground, delay application until majority of quackgrass have 4 - 5 green leaves. This stage is usually reached 1 - 4 weeks later than undisturbed ground.

   Canada thistle (fall rosette): Conduct summer fallow tillage as usual and perform the last tillage operation from July 5 to August 1. Allow thistles to regrow for a minimum of 5 weeks until they are 15 cm in diameter and majority of them in a rosette stage. Treatment after mild frost is possible if leaves are still green and actively growing but not after heavy damaging frost.

9. **How it Works:** A non-selective, systemic herbicide that moves from the foliage into the roots and kills the entire plant.

10. **Expected Results:** Gradual wilting and yellowing of the plant that advances to complete browning of above ground growth, and deterioration of underground plant parts occurs. For annuals, this occurs within 2 - 4 days; perennials require 7 - 10 days. Extremely cool and cloudy weather may slow activity of this product and delay visual effects of control.

11. **Effects of Rainfall:** Do not apply if rainfall is forecast for the time of application.

12. **Movement in Soil:** The amount of glyphosate leaching is very low.

Touchdown 480/Touchdown XP (cont'd)

13. **Grazing and Cropping Restrictions:** Do not graze or harvest treated areas.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1298 - 1760). Eye irritant. Non-toxic to bees, birds and fish.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 21 for further information). Follow directions for *Cleaning Clothing and Equipment* (see page 23) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage not required.

Preharvest Use

Application can be made prior to the harvest of wheat for the control of quack grass, Canada thistle, common milkweed and season-long control of perennial sow thistle.

Crop: Wheat, barley, canola, peas. **Do not** apply to crops grown for seed.

Rate: 1.0 L/ac.

With: Ground equipment only. Do not apply by air.

Water volume: 20 - 40 L/ac.

Crop timing: Apply when seed moisture is less than 30%. An accurate evaluation and measurement of seed moisture content must be made before pre-harvest application. This stage typically occurs 7 – 14 days before harvest. Consult table below to review visual indicators for each crop.

Weeds controlled: Quack grass, Canada thistle, common milkweed and season-long control of perennial sow-thistle and annual weeds.

Application tips: This treatment may also provide harvest management benefits by drying down crop and weed vegetative growth. For example, where late flushes of annual weeds, green vegetative crop growth or late tillering may interfere with harvest operations. Extremely cool and/or cloudy weather conditions between the time of application and the anticipated harvest date may slow down activity of this product thereby delaying crop drydown and harvest date. For best weed control results, quackgrass should be actively growing and have at least 4 - 5 green leaves; Canada thistle and perennial sow-thistle should be actively growing and at or beyond the bud stage. Applications for weed control (not harvest management) must be made at the correct stage of both weed and crop growth. Apply only during the period 7 - 14 days before harvest to ensure best weed control and maximize the harvest management benefits. Earlier application may reduce crop yield and/or quality, and may lead to excess glyphosate residues on the crop.

[illegible]

[illegible]	[illegible]	[illegible]
Wheat, barley	less than 30%	Hard dough stage: a thumbnail impression remains on the seed
Canola	less than 30%	Pods will be green to yellow; most of the seeds will have turned green to yellow
Peas	less than 30%	Majority of the pods will be brown with dry seeds; upper pods wrinkled and turning yellow with maturing rubbery seed.

Transline *(clopyralid)*

Available to industrial application only

Group 4

Manufacturer: Dow AgroSciences Canada Inc

1. **Formulations:** Solution; 360 g/L; 4.45 L jug.
2. **Registered Mixes:** 2, 4-D ester and amine, MCPA ester and amine.
3. **Crops:** Non-crop areas, right-of-ways, roadsides, storage sites, industrial manufacturing sites, balsam fir Christmas tree stands or plantations, rangeland or grass pasture.
4. **Weeds Controlled:** Canada thistle, vetch, alsike clover, wild buckwheat, common groundsel, common ragweed, perennial sow-thistle (top growth control), scentless chamomile.
5. **Weeds Suppressed:** Sheep sorrel, ox-eye daisy.
6. **When Used:**

   Non-crop land: Canada thistle, perennial sow-thistle and scentless chamomile between rosette and pre-bud stage. Wild buckwheat 2 - 6 leaf, common ragweed 5 - 10 cm in height, vetch when stems are 10 - 15 cm long. All other weeds prior to 15 cm height. Apply when weeds are actively growing with adequate soil moisture.

   Rangeland or grass pasture: Seedling grasses at 2 - 4 leaf stage. For established grasses, apply at shot-blade stage or in fall after harvest or early spring. Do not apply tank mixes containing 2,4-D or MCPA.

   Balsam fir Christmas tree stands or plantations: Apply when vetch stems are 10 - 15 cm long and prior to the vetch climbing into the tree crown. Do not use on seedbeds, transplants or any over the top applications. Do not apply tank mixes containing 2,4-D or MCPA.
7. **How to Apply:**

Crop	[illegible]	[illegible]
Non-crop	170 mL/ac	Canada thistle (suppression of top growth for 6 - 8 weeks) vetch (Vicia spp.) alsike clover
	227 mL/ac	Canada thistle (season-long top growth control) scentless chamomile wild buckwheat common groundsel common ragweed sheep sorrel (suppression) ox-eye daisy (suppression) perennial sow-thistle (top growth control)
	336 mL/ac	Canada thistle (season-long control of top growth with a reduction in population in the following year)

Tank mix with 170 - 225 g ai/ac 2,4-D or MCPA amine or ester for additional weed control on roadsides or vacant lots. Tank mix with 170 - 225 g ai/ac 2,4-D amine for additional broadleaf control on right of way and associated station, industrial manufacturing sites and storage sites.

Touchdown 480/Touchdown XP (cont'd)

13. **Grazing and Cropping Restrictions:** Do not graze or harvest treated areas.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (1298 - 1760). Eye irritant. Non-toxic to bees, birds and fish.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 21 for further information). Follow directions for *Cleaning Clothing and Equipment* (see page 23) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Heated storage not required.

Preharvest Use

Application can be made prior to the harvest of wheat for the control of quack grass, Canada thistle, common milkweed and season-long control of perennial sow thistle.

Crop: Wheat, barley, canola, peas. **Do not** apply to crops grown for seed.

Rate: 1.0 L/ac.

With: Ground equipment only. Do not apply by air.

Water volume: 20 - 40 L/ac.

Crop timing: Apply when seed moisture is less than 30%. An accurate evaluation and measurement of seed moisture content must be made before pre-harvest application. This stage typically occurs 7 – 14 days before harvest. Consult table below to review visual indicators for each crop.

Weeds controlled: Quack grass, Canada thistle, common milkweed and season-long control of perennial sow-thistle and annual weeds.

Application tips: This treatment may also provide harvest management benefits by drying down crop and weed vegetative growth. For example, where late flushes of annual weeds, green vegetative crop growth or late tillering may interfere with harvest operations. Extremely cool and/or cloudy weather conditions between the time of application and the anticipated harvest date may slow down activity of this product thereby delaying crop drydown and harvest date. For best weed control results, quackgrass should be actively growing and have at least 4 - 5 green leaves; Canada thistle and perennial sow-thistle should be actively growing and at or beyond the bud stage. Applications for weed control (not harvest management) must be made at the correct stage of both weed and crop growth. Apply only during the period 7 - 14 days before harvest to ensure best weed control and maximize the harvest management benefits. Earlier application may reduce crop yield and/or quality, and may lead to excess glyphosate residues on the crop.

Guidelines for timing of pre-harvest applications

Crop(s)	Per cent seed moisture	Visual symptoms
Wheat, barley	less than 30%	Hard dough stage: a thumbnail impression remains on the seed
Canola	less than 30%	Pods will be green to yellow; most of the seeds will have turned green to yellow
Peas	less than 30%	Majority of the pods will be brown with dry seeds; upper pods wrinkled and turning yellow with maturing rubbery seed.

Transline *(clopyralid)*

Available to industrial application only

Group 4

Manufacturer: **Dow AgroSciences Canada Inc.**

1. **Formulations:** Solution; 360 g/L; 4.45 L jug.
2. **Registered Mixes:** 2, 4-D ester and amine, MCPA ester and amine.
3. **Crops:** Non-crop areas, right-of-ways, roadsides, storage sites, industrial manufacturing sites, balsam fir Christmas tree stands or plantations, rangeland or grass pasture.
4. **Weeds Controlled:** Canada thistle, vetch, alsike clover, wild buckwheat, common groundsel, common ragweed, perennial sow-thistle (top growth control), scentless chamomile.
5. **Weeds Suppressed:** Sheep sorrel, ox-eye daisy.
6. **When Used:**

Non-crop land: Canada thistle, perennial sow-thistle and scentless chamomile between rosette and pre-bud stage. Wild buckwheat 2 - 6 leaf, common ragweed 5 - 10 cm in height, vetch when stems are 10 - 15 cm long. All other weeds prior to 15 cm height. Apply when weeds are actively growing with adequate soil moisture.

Rangeland or grass pasture: Seedling grasses at 2 - 4 leaf stage. For established grasses, apply at shot-blade stage or in fall after harvest or early spring. Do not apply tank mixes containing 2,4-D or MCPA.

Balsam fir Christmas tree stands or plantations: Apply when vetch stems are 10 - 15 cm long and prior to the vetch climbing into the tree crown. Do not use on seedbeds, transplants or any over the top applications. Do not apply tank mixes containing 2,4-D or MCPA.

7. **How to Apply:**

Crop	Rate	Weeds controlled
Non-crop	170 mL/ac	Canada thistle (suppression of top growth for 6 - 8 weeks) vetch (Vicia spp.) alsike clover
	227 mL/ac	Canada thistle (season-long top growth control) scentless chamomile wild buckwheat common groundsel common ragweed sheep sorrel (suppression) ox-eye daisy (suppression) perennial sow-thistle (top growth control)
	336 mL/ac	Canada thistle (season-long control of top growth with a reduction in population in the following year)

Tank mix with 170 - 225 g ai/ac 2,4-D or MCPA amine or ester for additional weed control on roadsides or vacant lots. Tank mix with 170 - 225 g ai/ac 2,4-D amine for additional broadleaf control on right of way and associated station, industrial manufacturing sites and storage sites.

Transline (cont'd)

Rangeland and pasture		
Kentucky blue grass, Smooth bromegrass, reed canary grass, creeping red fescue, meadow foxtail, orchard grass, altai wild ryerass, Russian wild ryegrass, timothy, crested wheatgrass, intermediate wheatgrass, slender wheatgrass, streambank wheatgrass and tall wheatgrass	170 mL/ac	Canada thistle (suppression of top growth for 6 - 8 weeks) vetch (Vicia spp.) alsike clover
	227 mL/ac	Canada thistle (season-long top growth control) scentless chamomile wild buckwheat common groundsel common ragweed sheep sorrel (suppression) ox-eye daisy (suppression) perennial sow-thistle (top growth control)
	336 mL/ac	Canada thistle (season-long control of top growth with a reduction in population in the following year)

Only one application per season.
Do not tank mix with MCPA or 2,4-D.

Balsam fir Christmas tree stands or plantations		
	170 mL/ac	vetch

8. **Application Tips:** Non-crop areas. Make sure the sprayer tank has been cleaned thoroughly before Transline is mixed. Treat during warm weather when weeds are actively growing. Best results are obtained when Canada thistle is actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of Canada thistle may be severely reduced. Sow-thistle plants emerging after spraying will not be controlled.
   Tank mixing Transline with 2,4-D or MCPA ester or amine will control many additional weeds (see appropriate 2,4-D and MCPA labels).

   Rangeland and grass pasture: Dilute in 45 - 50 L/ac water. Make only one application per season by ground sprayer. For seedling grasses, apply at 2 - 4 leaf stage. For established grasses, apply at shot-blade stage or in the fall after harvest or in early spring. Do not apply tank mixtures containing 2,4-D or MCPA.

   Balsam fir Christmas tree stands or plantations: Dilute in 60 - 80 L/ac water. Apply when vetch is 10 - 15 cm long and before it climbs into tree crown. Avoid contact with upper two thirds of crown. Do not use on seedbeds, transplants or any over-the-top applications. Do not apply tank mixtures containing 2,4-D or MCPA.
9. **How it Works:** Clopyralid is a systemic, hormone-type herbicide. It is absorbed by leaf and stem surfaces and is readily translocated. Maximum efficacy results from foliar application to young, actively growing plants.
10. **Expected Results:** Herbicide symptoms on affected plants include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change color, first to dark green and then to yellow before turning brown as they die. Maximum effectiveness results from foliar applications to young, actively growing plants. Death of weeds may not occur until 14 - 21 days after application. With the lowest rate of Transline on Canada thistle, some regrowth may occur by the end of the season.
11. **Effects of Rainfall:** A rain-free period of 4 - 6 hours is required.
12. **Movement in Soil:** Clopyralid is somewhat soluble in water but is generally not mobile in soil under typical prairie conditions.

Transline (cont'd)

Rangeland and pasture		
Kentucky blue grass, Smooth bromegrass, reed canary grass, creeping red fescue, meadow foxtail, orchard grass, altai wild ryerass, Russian wild ryegrass, timothy, crested wheatgrass, intermediate wheatgrass, slender wheatgrass, streambank wheatgrass and tall wheatgrass	170 mL/ac	Canada thistle (suppression of top growth for 6 - 8 weeks) vetch (Vicia spp.) alsike clover
	227 mL/ac	Canada thistle (season-long top growth control) scentless chamomile wild buckwheat common groundsel common ragweed sheep sorrel (suppression) ox-eye daisy (suppression) perennial sow-thistle (top growth control)
	336 mL/ac	Canada thistle (season-long control of top growth with a reduction in population in the following year)
Only one application per season. Do not tank mix with MCPA or 2,4-D.		
Balsam fir Christmas tree stands or plantations		
	170 mL/ac	vetch

8. **Application Tips:** Non-crop areas. Make sure the sprayer tank has been cleaned thoroughly before Transline is mixed. Treat during warm weather when weeds are actively growing. Best results are obtained when Canada thistle is actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of Canada thistle may be severely reduced. Sow-thistle plants emerging after spraying will not be controlled.

   Tank mixing Transline with 2,4-D or MCPA ester or amine will control many additional weeds (see appropriate 2,4-D and MCPA labels).

   Rangeland and grass pasture: Dilute in 45 - 50 L/ac water. Make only one application per season by ground sprayer. For seedling grasses, apply at 2 - 4 leaf stage. For established grasses, apply at shot-blade stage or in the fall after harvest or in early spring. Do not apply tank mixtures containing 2,4-D or MCPA.

   Balsam fir Christmas tree stands or plantations: Dilute in 60 - 80 L/ac water. Apply when vetch is 10 - 15 cm long and before it climbs into tree crown. Avoid contact with upper two thirds of crown. Do not use on seedbeds, transplants or any over-the-top applications. Do not apply tank mixtures containing 2,4-D or MCPA.

9. **How it Works:** Clopyralid is a systemic, hormone-type herbicide. It is absorbed by leaf and stem surfaces and is readily translocated. Maximum efficacy results from foliar application to young, actively growing plants.

10. **Expected Results:** Herbicide symptoms on affected plants include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change color, first to dark green and then to yellow before turning brown as they die. Maximum effectiveness results from foliar applications to young, actively growing plants. Death of weeds may not occur until 14 - 21 days after application. With the lowest rate of Transline on Canada thistle, some regrowth may occur by the end of the season.

11. **Effects of Rainfall:** A rain-free period of 4 - 6 hours is required.

12. **Movement in Soil:** Clopyralid is somewhat soluble in water but is generally not mobile in soil under typical prairie conditions.

13. **Grazing and Cropping Restrictions:**

    Drift: Small amounts of drift may damage sensitive plants such as legumes.

    Succeeding crops: Areas previously treated with Transline can be seeded to barley, canola, forage grass crops, flax, mustard, oats, rapeseed, rye, wheat, or they can be summer fallowed the year after treatment. Do not seed to crops other than those listed above the year after treatment. For more cropping and use information, contact your Dow AgroSciences Canada Inc. representative.

    Grazing restrictions: None. If necessary, forages may be grazed immediately following application.

    Use of manure and straw from treated crops: Transline residues in straw may be harmful to susceptible plants. Do not use straw from treated crops for composting or mulching on susceptible broadleaf crops. Manure can be spread on fields that will be seeded to barley, flax, oats, canola (rapeseed), rye or wheat. Do not grow susceptible crops such as peas, beans, lentils, potatoes, sunflowers or other sensitive crops on land that has been mulched with straw containing Transline residues within the last 12 months.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = greater than 2,000 mg/kg. Acute oral LD_{50} (bees) = greater than 100 μg/bee. Extremely low toxicity to fish.

15. **Precautions, First Aid:** Flammable. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlines nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Store in heated storage away from open flames or sparks. If frozen, warm slowly to room temperature and mix thoroughly before use.

Treflan *(trifluralin)*
(cereals)

Group 3

Manufacturer **Dow AgroSciences Canada Inc**

1. **Formulations:** Emulsifiable Concentrate; Treflan 480 EC; 480 g/L, 9.45 L jug, 115 L and 700 L containers. Granular; Treflan QR5; 5%; 25, 725 kg bags.

2. **Registered Mixes:** Treflan QR5: None. Treflan EC: Avadex BW, liquid fertilizer, Avadex BW+liquid fertilizer.

   Mixing restrictions: Add Treflan or Treflan+Avadex directly into the liquid fertilizer, mix thoroughly and apply as soon as possible. Agitate until application is complete.

3. **Crops:**

   Treflan EC: Barley (8.9), wheat (durum, spring) (8.6).

   Treflan QR5: Barley only.

   Underseeding: Not recommended.

4. **Weeds Controlled:**

   Treflan EC: Green and yellow foxtail.

   Treflan QR5: See *Treflan (Oilseeds)*.

5. **Weeds Suppressed:** None.

Treflan (cereals) (cont'd)

6. **When Used:**

Treflan EC: Alone or with Avadex BW in the spring only after seeding and prior to crop emergence.

Treflan QR5: Fall only. September 1 to soil freeze-up. Do not apply on land treated with Treflan or any product containing trifluralin since June 1 of the previous year.

Note: For fall applications where erosion may be a problem, maximize crop residue cover with only one fall tillage incorporation.

7. **How to Apply:**

With: Ground equipment.

Rate:

Treflan 480 EC: 485 mL/ac on light to medium textured soil and 690 mL/ac on heavy textured soil.

Treflan QR5: See *Special Use* below.

Water volume: 45 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: Incorporate 2 - 4 cm with two cross harrowings with tyne or diamond harrows operated at a minimum of 9 km/h.

Treflan EC: Both incorporations must be done within 24 hours of application.

Treflan QR5: See *Special Use* below.

8. **Application Tips:** Apply only on trash free or summer fallow fields. Crop must be seeded 5 - 8 cm deep in a well tilled seedbed to prevent contact between the chemical and the seed.

Treflan QR5: See *Special Use* below.

9. **How it Works:** Acts on both the root and shoot tips as they emerge. Prevents cell division and affected plants die before emergence. If the shoot portion of the plant escapes to the soil surface, lateral or secondary root growth is inhibited, causing a slow death since the plant is unable to gather moisture or nutrients.

10. **Expected Results:**

Green foxtail: Seeds germinating in the treated layer die before reaching the soil surface because root and shoot growth are inhibited. Seeds germinating below the treated layer will produce plants that will emerge. The secondary root system of plants that form within the treated layer is completely inhibited by trifluralin present in that area. The affected plant dies slowly as crop competition and temperature stress over-tax the rootless plant's ability to take up moisture. Populations of green foxtail tolerant to trifluralin products including Treflan have developed in fields in Western Canada. Treflan will not control trifluralin-tolerant green foxtail. Herbicide rotation should be practised to avoid the spread of trifluralin-tolerant green foxtail. Avoid repeated use of trifluralin products in the same field.

Crop: Crop safety is maintained when seeded to a depth of 5 - 8 cm.

11. **Effects of Rainfall:** No effect once incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze treated crop or cut for hay; there are not sufficient data available to support such use. Under normal conditions, Treflan carry-over will not harm crops grown in rotation. As a precaution, oats, sugar beets, creeping red fescue, and small-seeded grasses such as timothy and canary seed should not be grown following a Treflan treated crop.

14. **Toxicity:** Very low acute mammalian toxicity: Acute oral LD_{50} (rats) (mg/kg) = technical (10,000). In clean water, fish are very sensitive to trifluralin, but in runoff and muddy water, trifluralin binds to the suspended soil particles, and large amounts can be tolerated by fish. Non-toxic to bees. Intake can cause heart, liver and kidney damage. Do not induce vomiting. Call a physician or poison control center.

15. **Precautions, First Aid:** Treflan 545 EC is highly flammable. May explode if heated. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:**

    Treflan EC: If stored below 5°C, bring contents to 15°C for 24 hours and shake well before using.

    Treflan QR5: Do not expose to high temperatures or prolonged direct sunlight. Do not let product remain in applicators under these conditions.

17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Treflan, Edge, Heritage, Bonanza, Rival and Fortress) will not control trifluralin-tolerant green foxtail. To delay selection or reduce the spread of trifluralin-tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin-tolerant green foxtail.

Special use QR5: Barley: fall application only (September 1 to soil freeze-up).

Weeds controlled: See Treflan QR5 under Treflan (Oilseeds).

Incorporation: For more effective weed control, the second incorporation should be delayed for 3 days.

Rate: Sandy textured, brown and dark brown soil (2 - 4% organic matter): 6.9 kg/ac. Medium or heavy textured, brown and dark brown soils (2 - 4% organic matter): 8.9 kg/ac. Sandy textured, black soils (4 - 6% organic matter): 8.9 kg/ac. Medium or heavy textured, black soils (4 - 6% organic matter): 11.3 kg/ac.

Warning: Do not apply on soils with less than 2% organic matter or on deep black soil with more than 6% organic matter. Do not apply on land treated with products containing trifluralin since June 1 of the previous year. Application to severely eroded knolls may result in reduced crop stand. Using press or hoe drill, seed 5 cm deep into a moist, warm seedbed. Avoid seeding into very cold soil. Seeding disease, cold weather, improper seeding depth, excessive moisture, high salt concentration or drought may weaken crop seedlings and increase the possibility of damage from Treflan.

Note: Similar products are Rival and Bonanza.

Special use QR5: Wheat – fall application only (September 1 to freeze-up).

Weeds controlled: Green foxtail.

Incorporation: Incorporate within 24 hours of application using field cultivator or disc operated at 8 - 10 cm/hr and set to work 5 - 8 cm deep. The second working should be done at the same depth and at right angles to the first. If workings are done in the fall, a **minimum** delay of 3 days between incorporations is required. All spring tillage following fall application of Treflan should be done when the soil is warm enough to promote germination.

Rate: 4.45 kg/ac.

Warning: Use good quality, certified seed. Application to severely eroded knolls may result in reduced crop stand. 2.2 kg/ac is the maximum use rate on wheat. Higher rates may result in crop injury.

Treflan *(trifluralin)*

(oilseeds, special crops)

[illegible] **Group 3**

Manufacturer **Dow AgroSciences Canada Inc**

1. **Formulations:** Emulsifiable Concentrate; Treflan 480 EC; 480 g/L, 9.45 L jug, 115 L and 700 L containers. Granular; Treflan QR5; 5%; 25, 725 kg bags.
2. **Registered Mixes:** Treflan EC: Amiben (soybean, sunflowers); Sencor 500 F or 75 DF [canola (triazine tolerant canola), fababeans]. Liquid nitrogen fertilizer (28-0-0).

   Mixing instructions: Pour directly into liquid fertilizer, mix thoroughly and apply as soon as possible with constant agitation.
3. **Crops:**

   alfalfa
   alsike clover
   beans (black, lima)
   beans, dry (kidney, snap, white)(8.0)
   bird's foot trefoil
   broccoli (transplant only)
   brussel sprouts (transplant only)
   cabbage
   canola (including triazine tolerant)(8.8)
   carrots
   cauliflower
   cicer milkvetch
   crambe*
   fababeans (8.6)
   flax**(7.7)
   lentils**(8.5)
   mustard (8.9)
   peas [field (8.7), canning]
   peppers (transplant only)
   red clover
   rutabaga
   safflower
   sainfoin*
   saskatoons
   shelterbelts***
   soybeans (8.9)
   sunflowers (8.9)
   sweet clover*
   tomatoes (transplant only)

   * Spring only.
   ** Fall only.
   *** Shelterbelts: ash (green), caragana, elm (American, Siberian), pine (Scotch).

   Alsike clover, bird's foot trefoil, cicer milkvetch, forage kale, red clover and turnip are registered under the minor use program and may or may not appear on the current product label.

   Underseeding: Not recommended for grasses.
4. **Weeds Controlled:**

   barnyard grass (8.3)
   bluegrass, annual (8.6)
   bromegrass
   bromegrass, downy (5.9)
   buckwheat, wild (8.3)
   chickweed (7.1)
   cockle, cow (9.0)
   darnel, Persian
   foxtail (green, yellow)(8.1)
   knotweed
   lamb's-quarters (8.0)
   oats, wild (7.5)
   pigweed (8.2)
   purslane (7.9)
5. **Weeds Suppressed:** None.
6. **When Used:**

   Treflan EC:

   Spring: Alfalfa, beans, canola (including triazine tolerant), crambe, fababeans, mustard, peas, safflower, sainfoin, shelterbelts, sunflowers and sweet clover. Cultivate to destroy existing weeds and apply immediately prior to or up to 3 weeks before planting.

   Summer: Canola (including triazine tolerant), flax and safflower. On summer fallow, between June 1 and September 1.

   Fall: Beans, canola (including triazine tolerant), flax, lentils, mustard, peas, safflower, soybeans, sunflowers. September 1 to soil freeze-up. Fall application is discouraged where soil drifting is a problem.

   Treflan QR5:

   Spring: Not recommended in Alberta.

   Summer: Canola (including triazine tolerant), flax – between June 1 and September 1.

   Fall: Alfalfa, beans (dry only), canola (including triazine tolerant), fababeans, flax, lentils, mustard, peas, soybeans, sunflowers – between September 1 and soil freeze-up.

   Note: Not recommended for fall applications where soil erosion may be a problem.

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7. How to Apply:

With: Ground equipment only.

Rate:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spring	2 - 6%	Sand to sandy loams	690 mL	NR*
		Silts to loams to clays	930 mL	NR*
	6 - 15%	Sand to sandy loams	930 mL	NR*
		Silts to loams to clays	930 mL - 1.2 L**	NR*
Fall	2 - 6%	Sand to sandy loams	930 mL	8.9 kg
		Silts to loams to clays	1.2 L	11.3 kg
	6 - 15%	Sand to sandy loams		11.3 - 13.7 kg**
		Silts to loams to clays	1.2 L - 1.4 L**	11.3 - 13.7 kg**
Summer		Silts to loams to clays only	1.4 L	

Note: * NR – Not Recommended.
** Higher rate for heavy wild oat infestations.

Shelterbelts:

Treflan 480 EC: Sand to sandy loams; 2 - 6% organic matter: 1.90 L/ac; silts to loams to clays; 6 - 15% organic matter: 3.75 L/ac.

Water volume: 45 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: First incorporation must be done within 24 hours of application. Second incorporation should be done at right angles to the first.

Fall application: It is recommended that both incorporations be completed in the fall.

Spring application: Apply Treflan EC when soil is in good working condition. Ensure early season flush of weeds is killed by first or second incorporation. Seed into a weed-free seedbed using an accepted cultural practice.

Summer application: The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth. **Spring tillage** after fall or summer application should be shallow with a disc or field cultivator (vibrashank) set to cut 5 - 8 cm deep. This should be done when soil is warm enough to promote germination. In areas with high wild oat populations, prework early in the spring with a shallow cultivation to promote weed seed germination, followed by a 5 - 8 cm deep cultivation prior to seeding to destroy existing green growth. Avoid transplanting weed seedlings, and seed into a weed-free seedbed.

Treflan QR5: Delay second incorporation for a **minimum** of 3 days. This allows time for greater release of QR5 into the soil and assures a more uniform distribution.

Flax, lentils: Both incorporations of Treflan EC or QR5 must be done in the fall. Fall or summer application should be followed by a spring tillage to a 5 - 8 cm depth before seeding.

Implements: A tandem disc, discer or field (vibrashank) cultivator are recommended for incorporating to 8 - 10 cm. Operate discs at 6 - 10 km/h and cultivator at 10 - 13 km/h. A tandem disc gives the best mixing action on stubble conditions. Do not use a field cultivator to incorporate Treflan when soil is crusted, lumpy or too wet for good mixing.

7. How to Apply:

With: Ground equipment only.

Rate:

Season	Organic matter	Soil texture	Treflan 480 EC quantity/ac	Treflan QR5 quantity/ac
Spring	2 - 6%	Sand to sandy loams	690 mL	NR*
		Silts to loams to clays	930 mL	NR*
	6 - 15%	Sand to sandy loams	930 mL	NR*
		Silts to loams to clays	930 mL - 1.2 L**	NR*
Fall	2 - 6%	Sand to sandy loams	930 mL	8.9 kg
		Silts to loams to clays	1.2 L	11.3 kg
	6 - 15%	Sand to sandy loams		11.3 - 13.7 kg**
		Silts to loams to clays	1.2 L - 1.4 L**	11.3 - 13.7 kg**
Summer		Silts to loams to clays only	1.4 L	

Note: * NR - Not Recommended.
** Higher rate for heavy wild oat infestations.

Shelterbelts:

Treflan 480 EC: Sand to sandy loams; 2 - 6% organic matter: 1.90 L/ac; silts to loams to clays; 6 - 15% organic matter: 3.75 L/ac.

Water volume: 45 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: First incorporation must be done within 24 hours of application. Second incorporation should be done at right angles to the first.

Fall application: It is recommended that both incorporations be completed in the fall.

Spring application: Apply Treflan EC when soil is in good working condition. Ensure early season flush of weeds is killed by first or second incorporation. Seed into a weed-free seedbed using an accepted cultural practice.

Summer application: The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth. **Spring tillage** after fall or summer application should be shallow with a disc or field cultivator (vibrashank) set to cut 5 - 8 cm deep. This should be done when soil is warm enough to promote germination. In areas with high wild oat populations, prework early in the spring with a shallow cultivation to promote weed seed germination, followed by a 5 - 8 cm deep cultivation prior to seeding to destroy existing green growth. Avoid transplanting weed seedlings, and seed into a weed-free seedbed.

Treflan QR5: Delay second incorporation for a **minimum** of 3 days. This allows time for greater release of QR5 into the soil and assures a more uniform distribution.

Flax, lentils: Both incorporations of Treflan EC or QR5 must be done in the fall. Fall or summer application should be followed by a spring tillage to a 5 - 8 cm depth before seeding.

Implements: A tandem disc, discer or field (vibrashank) cultivator are recommended for incorporating to 8 - 10 cm. Operate discs at 6 - 10 km/h and cultivator at 10 - 13 km/h. A tandem disc gives the best mixing action on stubble conditions. Do not use a field cultivator to incorporate Treflan when soil is crusted, lumpy or too wet for good mixing.

8. **Application Tips:** To avoid concentrating wild oat seeds below the treated layer, do not plow land prior to Treflan application. Do not apply to fields spread with manure during the last 12 months. Do not apply Treflan EC to soils with more than 20 - 25% straw cover or on standing weeds. On stubble, chop and thoroughly mix residues into the soil prior to addition of Treflan EC. If the swath from the previous crop was removed by burning, cultivate once to remove charcoal layer prior to Treflan application. Treflan QR5 can be used when trash is heavier or on standing weeds, provided they do not interfere with the distribution of the granule and do not limit incorporation. Do not apply on soils that are wet, in poor tilth or contain 15% or more organic matter. Do not apply on soils subjected to prolonged periods of flooding. Do not apply on soils with less than 2% organic matter. Application on eroded knolls may result in reduced crop stand or rotational crop injury.

   Flax, lentils: Shallowly till and pack the soil in the spring to ensure a firm seedbed and accurate depth for seeding. Seed into a well packed, warm, moist seedbed. Do not seed deeper than 4 cm.

   Triazine tolerant canola: Sencor or Bladex TTC may be applied as a sequential treatment after crop emergence to control several additional weeds.

9. **How it Works:** Kills seedlings as they germinate. Inhibits cell division in the actively growing points of root and shoot. It does not control established weeds.

10. **Expected Results:**

    Weeds: Most die before emerging. Weeds will exhibit swelling in the coleoptile region and stubby, thick primary root development with a lack of secondary roots, which leads to death due to inadequate moisture obtaining ability.

11. **Effects of Rainfall:** No effect once Treflan is incorporated into the soil.

12. **Movement in Soil:** None.

13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

    Succeeding crops: Normally, Treflan carry-over will not harm crops grown in rotation. As a precaution, oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not be grown in rotation following a Treflan treated crop. Drought conditions in the year of treatment may result in higher levels of trifluralin carry-over into the next year. To avoid wheat injury, seed less than 7 cm deep into a warm, moist seedbed using recommended agronomic practices that will promote rapid and even germination. Avoid direct seeding (zero till) and seeding into loose seedbeds. Refer to industry or government extension documents that outline seeding practices for each crop. As a precaution, do not seed wheat as a rotational crop on land that has received ethalfluralin or trifluralin at oilseed/special crop/barley rate for two consecutive years. Over-application caused by overlapping or improper calibration or non-uniform application may reduce the stand of treated crop or crop grown in rotation.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (10,000). In clean water, fish are very sensitive to trifluralin, but in runoff or muddy water, it binds to soil particles and large amounts can be tolerated by fish. Non-toxic to bees. Intake can cause heart, liver and kidney damage. Do not induce vomiting. Call a physician or poison control center.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:**

    Treflan EC: If stored below 5°C, bring contents to 15°C for 24 hours and shake well before using.

    Treflan QR5: Do not expose to high temperatures or prolonged direct sunlight. Do not let product remain in applicators under these conditions.

    Note: Similar products are Advance, Rival and Bonanza.

17. **Resistance Management:** Populations of green foxtail tolerant to trifluralin have developed in a number of fields in Western Canada that have had a long history of repeated trifluralin use. Trifluralin or ethalfluralin containing products (i.e., Advance 10G, Bonanza 10G/400, Edge, Fortress, Heritage, Rival and Treflan) will not control trifluralin-tolerant green foxtail. To delay selection or reduce the spread of trifluralin-tolerant green foxtail, avoid use of these products repeatedly in the same field, or use a separate herbicide application for control of trifluralin-tolerant green foxtail.

Triumph Plus *(fenoxaprop-p-ethyl + MCPA + thifensulfuron)*

Group 1,2,4

Manufacturer Aventis Crop Science

WARNING POISON

1. **Formulations:**
   1. Triumph FM: Emulsifiable Concentrate; 56 g/L; fenoxaprop-p-ethyl + 256 g/L MCPA Ester, 13.3 L container.
   2. Plus; Dry flowable; thifensulfuron; 75%, 162 g container.
2. **Registered Mixes:** Lontrel: 85 mL/ac for season-long control of Canada thistle.
3. **Crops:** All spring wheats (except durum). Seedling grasses for forage and seed: creeping red fescue, meadow bromegrass, intermediate wheatgrass, smooth bromegrass, tall fescue, tall wheat grass, slender wheat grass, Western wheatgrass, Northern wheat grass.
4. **Weeds Controlled:**

buckwheat, wild
burdock
chickweed
cocklebur
cockle, cow
flixweed*
foxtail, green and yellow
green smartweed
hemp-nettle
hoary cress**
horsetail, field**
kochia
lady's-thumb
lamb's-quarters
mustards (except dog and green tansy)
oats, wild
pigweed (redroot and Russian)
plantain**
prickly lettuce
radish, wild
ragweeds
rapeseed, volunteer
Russian thistle*
shepherd's-purse
spurry, corn
stinkweed
sunflower, annual
vetch

* Spring seedings only.
** Top growth control only.

5. **Weeds Suppressed:** Canada thistle.
6. **When Used:**

   Crop: Apply when crop has a minimum of 2 leaves and up to a maximum of 6 leaves on the main stem plus 3 tillers. 2 - 4 leaf stage of seedling grasses.

   Annual grassy weeds: Wild oats and foxtail (green and yellow): apply when the weeds are in the 1 - 6 leaf stage of growth. Plants will be controlled up to the emergence of the third tiller.

   Broadleaf weeds: Annual sunflower, ball mustard, burdock, cocklebur, field horsetail, flixweed, hoary cress, kochia, mustards, plantain, prickly lettuce, ragweeds, Russian pigweed, shepherd's-purse, vetch and wild radish: apply at 2 - 4 leaf stage; corn spurry, cow cockle, green smartweed, hemp-nettle, lady's-thumb, lamb's-quarters, redroot pigweed, Russian thistle, stinkweed, volunteer rapeseed and wild mustard: apply when weeds are less than 10 cm tall or across; chickweed: apply at 1 - 6 leaf stage; wild buckwheat: apply at 1 - 3 leaf stage. Apply to emerged, young actively growing weeds. Weeds that emerge after application will not be controlled. Canada thistle: apply when less than 10 cm tall or across.

Triumph Plus (cont'd)

Note: Treatment at the 3 - 4 leaf stage of crops and weeds usually combines maximum crop tolerance and weed susceptibility. Some broadleaf weeds may not be controlled if infestation is heavy, weeds are in bud or weather is dry and cool.

7. How to Apply:

With: Ground equipment. Do not apply by aircraft.

Rate:
Triumph FM: 0.67 L/ac.
Plus: 8.1 g/ac.

Water volume: 22.5 - 45 L/ac.

Pressure: Ground: 275 kPa.

Nozzles: Only 110° or 80° stainless steel flat fan nozzles are recommended. Uniform, thorough coverage is important to achieve good control.

Mixing instructions:

1. Ensure the spray tank is thoroughly clean.
2. Fill the tank half full with clean water and start agitation or bypass system.
3. Slowly add the correct amount of Plus (container #1) to the spray tank. Agitate thoroughly until Plus is completely in suspension.
4. Add the correct amount of Triumph FM (container #2) and continue agitation.
5. Triple rinse containers into the spray tank.
6. Add the remaining amount of water while agitation continues. Spray out immediately. Spray mixture should not be left in tank overnight.
7. On repeat loads, prepare a Plus (container #1) slurry in water by slowly adding the correct amount of Plus to 20 litres of water, and add to spray tank. Agitate thoroughly until Plus is completely in suspension. Repeat steps 4, 5 and 6.

Sprayer cleanup:

When moving into wheat, barley, rye or flax:
When moving into wheat, barley, spring or fall rye, or flax immediately following the application of Triumph Plus Tank Mix, clean the sprayer by flushing thoroughly with a water/detergent mixture.

Note: Broadleaf crops can be damaged by Triumph Plus Tank Mix residues in the spray tank even after a number of applications of a different product. It is critical to thoroughly clean and remove all traces of Triumph Plus Tank Mix from the spray tank prior to moving into a broadleaf crop.

When moving into broadleaf crops:
In all cases, prior to spraying a broadleaf crop (such as canola, peas, lentils, alfalfa, sugar beets, vegetables, etc.), complete a thorough cleaning of the tank because the Plus component of the Triumph Plus Tank Mix can cause crop injury to sensitive crops at very low concentrations. Follow the clean-up instructions below to ensure adequate sprayer cleaning and removal of the Triumph Plus Tank Mix.

Clean-up instructions prior to spraying broadleaf crops:

1. Drain and flush tank, boom and hoses with clean water for a minimum of ten minutes. Visually inspect tank to ensure removal of all residues. If necessary, repeat step.
2. Fill tank with clean water while adding 1 litre household ammonia (containing a minimum 3% ammonia) per 100 L of water. Flush solution through boom and hoses, and then add more water to completely fill tank. Allow to sit for 15 minutes with agitation. Again, flush the hoses, boom and nozzles with cleaning solution and drain tank.
3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
4. Repeat step 2.
5. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

8. **Application Tips:** Do not treat spring wheat underseeded to forages. During periods of stress, plants are not actively growing. When daytime temperatures before or after application are very hot (28°C or 82°F) and/or conditions are very dry and/or there is low humidity, plants are under stress. Application of Triumph Plus tank mix during these periods may result in substantially reduced control. Application of the spray at a forward angle of 45° will result in better penetration of the canopy and better coverage. Do not apply to crop stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result.

9. **How it Works:**

   Fenoxaprop-p-ethyl: Contact as well as systemic, no soil activity. Regions of high meristematic activity, such as root and shoot tips are known to be affected. MCPA: disrupts cell division and causes abnormal growth responses that affect respiration and food reserves. Thifensulfuron: absorbed by foliage. Inhibits cell elongation.

10. **Expected Results:** Grassy weeds: reduction of leaf growth and chlorotic blotching within 1 - 3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and complete death within 14 - 21 days after application. Broadleaf weeds: growth stops almost immediately. Discoloration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed susceptibility. **Poor results may be expected if** improper mixing, timing, coverage or when weeds are under drought stress.

11. **Effects of Rainfall:** Do not apply Triumph Plus if rain is expected within 2 hours.

12. **Movement in Soil:** Fenoxaprop-p-ethyl appears to undergo rapid hydrolysis in the soil. MCPA is readily leached from the soil. Thifensulfuron moves little in the soil and has a very short life in the soil.

13. **Grazing and Cropping Restrictions:** Do not graze treated fields prior to harvest. Pre-harvest interval: 80 days.

14. **Toxicity:** Triumph FM (fenoxaprop-p-ethyl + MCPA ester): acute oral LD_{50} (rats) (mg/kg) = 2940; Thifensulfuron: low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 5,000.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

16. **Storage:** Keep away from fire or open flame or other sources of heat. **Cannot** be stored below freezing. If stored for 1 year or longer, shake well before using. Store the tightly closed containers away from seeds, fertilizer, plants and foodstuffs. Do not use or store in or around the home.

17. **Resistance Management:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Ally, Amber, Express, Muster, Refine Extra, the DF component of Laser DF and the Plus component of Champion Plus and Triumph Plus. To delay selection of resistant populations, rotate the use of Ally, Amber, Champion Plus, Express, Laser DF, Muster, Refine Extra and Triumph Plus with other herbicides effective on the same weeds. Avoid the use of these herbicides repeatedly in the same field.

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Tropotox Plus/Clovitox Plus

(MCPB + MCPA)

Group 4

Manufacturer: **Nufarm/Interprovincial Co-op Ltd.**

CAUTION POISON

1. **Formulations:** Water Soluble Solution; 375 g/L MCPB + 25 g/L MCPA; 10 L container.
2. **Registered Mixes:** None.
3. **Crops:**

barley (8.8)
clover seedlings
[alsike (7.2), Ladino, red, white Dutch, wild white]
corn (field)
oats
pasture
peas (7.2)
rye (fall)
wheat (spring)(8.9)

Underseeding: Clover can be used on barley, oats, wheat companion crops.

Seedling grasses

altai fescue
altai wild ryegrass
creeping red fescue
crested wheatgrass
green needlegrass
intermediate wheatgrass
meadow bromegrass
meadow fescue
northern wheatgrass
pubescent wheatgrass
red canary grass
Russian wild ryegrass
slender wheatgrass
smooth bromegrass
streambank wheatgrass
tall fescue
tall wheatgrass
Timothy
western wheatgrass

4. **Weeds Controlled:**

dock, curled
lamb's-quarters (8.1)
mustard (ball, wild, wormseed)(7.9)
pigweed, redroot (7.4)
plantains
ragweed
rapeseed, volunteer
shepherd's-purse (5.0)
stinkweed (7.5)
thistle, bull

5. **Weeds Suppressed:**

bindweed, field (3.2)
buttercup (creeping, tall)
hemp-nettle (5.9)
horsetail
radish, wild
sow-thistle [annual (5.4), perennial]
thistle, Canada

6. **When Used:**

Cereals: 2 leaf to flag leaf stage.

Clover: 1 - 4 true leaf stage.

Corn: After 45 cm high but before tasseling begins, with drop nozzles.

Pasture: After grazing or cutting.

Peas: 3 - 6 expanded leaves or 2 - 5 nodes. (**Important:** Damage may be caused, particularly in early maturing varieties, if spraying is carried out after this stage.)

Seedling grasses: 2 - 4 leaf stage.

Annual weeds: Seedling stage.

Bull thistle: Rosette to early bud stage.

Bindweed, buttercups: In spring, when growth is vigorous.

Canada thistle: 15 cm to early bud stage.

Curled dock, perennial sow-thistle, plantains: Young plants in rosette stage.

Horsetail: When 15 cm tall.

7. **How to Apply:**

With: Ground equipment.

Rate: 1.1 - 1.7 L/ac depending on weeds to be controlled.

Tropotox Plus/Clovitox Plus

(MCPB + MCPA)

Group 4

Manufacturer **Nufarm/Interprovincial Co-op Ltd.**

CAUTION POISON

1. **Formulations:** Water Soluble Solution; 375 g/L MCPB + 25 g/L MCPA; 10 L container.
2. **Registered Mixes:** None.
3. **Crops:**

barley (8.8)
clover seedlings
[alsike (7.2), Ladino, red, white Dutch, wild white]
corn (field)
oats
pasture
peas (7.2)
rye (fall)
wheat (spring)(8.9)

Underseeding: Clover can be used on barley, oats, wheat companion crops.

[illegible]

altai fescue
altai wild ryegrass
creeping red fescue
crested wheatgrass
green needlegrass
intermediate wheatgrass
meadow bromegrass
meadow fescue
northern wheatgrass
pubescent wheatgrass
red canary grass
Russian wild ryegrass
slender wheatgrass
smooth bromegrass
streambank wheatgrass
tall fescue
tall wheatgrass
Timothy
western wheatgrass

4. **Weeds Controlled:**

dock, curled
lamb's-quarters (8.1)
mustard (ball, wild, wormseed)(7.9)
pigweed, redroot (7.4)
plantains
ragweed
rapeseed, volunteer
shepherd's-purse (5.0)
stinkweed (7.5)
thistle, bull

5. **Weeds Suppressed:**

bindweed, field (3.2)
buttercup (creeping, tall)
hemp-nettle (5.9)
horsetail
radish, wild
sow-thistle [annual (5.4), perennial]
thistle, Canada

6. **When Used:**

Cereals: 2 leaf to flag leaf stage.

Clover: 1 - 4 true leaf stage.

Corn: After 45 cm high but before tasseling begins, with drop nozzles.

Pasture: After grazing or cutting.

Peas: 3 - 6 expanded leaves or 2 - 5 nodes. (**Important:** Damage may be caused, particularly in early maturing varieties, if spraying is carried out after this stage.)

Seedling grasses: 2 - 4 leaf stage.

Annual weeds: Seedling stage.

Bull thistle: Rosette to early bud stage.

Bindweed, buttercups: In spring, when growth is vigorous.

Canada thistle: 15 cm to early bud stage.

Curled dock, perennial sow-thistle, plantains: Young plants in rosette stage.

Horsetail: When 15 cm tall.

7. **How to Apply:**

With: Ground equipment.

Rate: 1.1 - 1.7 L/ac depending on weeds to be controlled.

Seedling grasses: 1.1 - 1.4 L/ac.

Water volume: 60 - 80 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** Spray in warm weather when plants are actively growing. Peas: Spray when growing conditions are good and the peas are not under stress from drought or disease.
9. **How it Works:** A systemic, absorbed by leaves and stems and translocated to actively growing regions. It disrupts cell division, stops cell growth and interferes with respiration and food reserves. Selectivity based on ability of plant to efficiently convert MCPB to MCPA.
10. **Expected Results:**

    Broadleaf weeds: Should be dead within 2 - 3 weeks of treatment. **Poor results may be expected if** water volume is incorrect or weeds are too mature.
11. **Effects of Rainfall:** Rainfall before the foliage has dried from the spraying may decrease activity.
12. **Movement in Soil:** Readily leached from soil. Longer residual in dry soil.
13. **Grazing and Cropping Restrictions:** Do not graze the treated crop or cut for forage until 30 days after treatment. Do not graze the seedling grasses or cut for hay in the year of establishment.
14. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (500). Non-toxic to bees. Intake can cause convulsions and coma. Can cause burns to the skin and eyes.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in heated area.

Unity *(bromoxynil + triasulfuron)*

[illegible]

Group 2,6

Manufacturer **Aventis Crop Science**

1. **Formulations:** Unity 280EC; Emulsifiable Concentrate; 280 g/L bromoxynil, 2 x 4 L jug; Unity 75WG: water dispersible granule; 75% triasulfuron 4 x 43 g.
2. **Registered Mixes:** Puma (spring wheat or durum wheat); Puma Super (spring wheat). Surfactant not required when tank mixing with Puma and Puma Super, MCPA ester (wheat and barley), 2,4-D ester (wheat and barley), Lontrel (wheat and barley).

    Surfactants: Always use a surfactant with this tank mix application. Use a recommended non-ionic surfactant such as Agral 90, Ag-Surf, Citowett Plus, Super Spreader-Sticker, or Companion when applying Unity post-emergent at 0.25% v/v (2.5 L per 1000 L spray mixture).
3. **Crops:** Wheat (spring, durum), barley.
4. **Weeds Controlled:**

    annual smartweed (green smartweed & lady's-thumb)
    chickweed
    cleavers
    cow cockle
    flixweed
    hemp-nettle
    kochia
    lamb's-quarters
    redroot pigweed
    shepherd's-purse
    stinkweed
    volunteer canola
    wild buckwheat
    wild mustard
5. **Weeds Suppressed:** None.

Unity (cont'd)

6. When Used:

Crops: 2 leaf stage just prior to flag leaf of wheat and barley.

Weeds: 2 - 4 leaf stage (two pairs of true leaves).

7. How to Apply:

With: Ground equipment. **Do not** apply by air.

Rate: Unity 75WG at 4.3 g/ac plus Unity 280EC at 200 mL/ac.

Surfactant: 0.25% v/v (2.5 L per 1000 L of spray mixture).

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan with 50 mesh screens or larger.

Mixing Instructions:

1. Fill the spray tank one-quarter full with water. Engage gentle jet agitation. On sprayers with by-pass agitation, the agitation should not be engaged until the water soluble bags are completely dissolved. Otherwise, undissolved bags can become lodged on the main screen.
2. Ensure the agitation system is working properly and that it creates a rippling or rolling action on the water surface.
3. Add the appropriate number of Unity 75WG water soluble bags directly into the spray tank. **Do not** touch water soluble bags with wet gloves. Allow 6 minutes for complete mixing. Add the required amount of Unity 280EC to the spray tank. Allow a further 2 minutes for complete mixing. Longer mixing time may be required due to cold water or if the water soluble bags are brittle.
4. Continue agitation while completing the filling of sprayer; then add the recommended surfactant 2.5 L for each 1000 L of water. Ensure Unity 75WG is completely in suspension before spraying.
5. Continuous agitation is required to keep Unity 75WG in suspension. **Do not** allow the spray mixture to stand without agitation.
6. Use the spray suspension as soon as it is prepared.

Sprayer clean-up: To avoid subsequent injury to crops other than cereals, thoroughly clean application equipment immediately after spraying. Ensure that all traces of the product are removed. The following recommendations are provided.

1. Drain and flush the tank, boom and all hoses for several minutes with clean water containing a household detergent. **Do not** clean the sprayer near desirable vegetation, wells or other water sources.
2. Fill the sprayer tank with clean water and add one litre of household ammonia (containing 3% ammonia) per 100 L of water. Allow the solution to agitate for 15 minutes prior to flushing through the boom and nozzles and then drain the system.

   Caution: Do not use ammonia with chlorine bleach.
3. Remove the nozzles and screens and wash separately in a bucket containing the ammonia solution.
4. Thoroughly rinse the tank, hoses, booms, nozzles and screens with clean water for 5 minutes to remove all traces of ammonia.
5. Dispose of all rinsings in accordance with provincial regulations.

8. Application Tips: Adequate control may not be achieved under unfavorable conditions such as drought, flooding, prolonged temperature extremes or insufficient fertility.

9. How it Works: Absorbed through the leaves of emerged weeds and is rapidly translocated to the weed's growing points.

10. Expected Results:

Weeds: Visual symptoms (discoloration) take 1 - 3 weeks to appear, depending on the weed species and growing conditions. Death of weeds usually takes 3 - 4 weeks after application.

11. Effects of Rainfall: **Do not** apply if rain is expected within 2 hours of spraying.

12. Movement in Soil: Degradation of Unity 75WG in the soil is affected by rainfall, soil temperature and soil pH. The breakdown process is more rapid with soil conditions of high moisture, high temperature and low pH.

13. **Grazing and Cropping Restrictions:** **Do not** use treated cereals for grazing of livestock or green feed until 30 days after application. To avoid injury to subsequent crops after an application of recommended rates of Unity, the following recropping intervals should be observed.

Recropping Guidelines for Post-Emergent Use

Crop	[illegible]		
	Soil pH 6.4 or Less	Soil pH 6.5 - 7.4	Soil pH Greater than 7.5
Spring wheat (hard red, Canada Prairie extra strong)	No Restrictions	No Restrictions	No Restrictions
Durum wheat, barley, oats	10	10	10
Flax	10	10	22
Peas	10	22	22
Canola	10	22	34
Canary seed	22	22	22
Mustard	22	22	34
Lentils, sunflowers, all other crops	Bioassay	Bioassay	Bioassay

14. **Toxicity:**

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **If inhaled**, remove individual from site of exposure.

16. **Storage:**

    Unity 280EC will solidify at temperatures below -20°C but will become useable again at temperatures above 0°C. **Shake well before using.**

    Unity 75WG: Store above freezing. Prolonged storage at temperatures below 0°C may cause the soluble bag to become brittle.

17. **Weed Resistance:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Unity, Logran, Amber, Ally, Express, Pack, Muster, Refine Extra, the DF component of Laser DF, and the Plus component of Triumph Plus. These populations are able to survive a use rate several times higher than needed to control susceptible populations. To delay selection of resistant populations, rotate the use of Unity, Logran, Amber, Ally, Express Pack, Muster, and Refine Extra with other herbicides effective on the same weeds. Avoid the use of Logran, Amber, Ally, Express Pack, Muster, and Refine Extra repeatedly in the same field. For information pertaining to the proper use of Laser DF and Triumph Plus to delay selection of resistant populations, please refer to their respective labels.

13. **Grazing and Cropping Restrictions: Do not** use treated cereals for grazing of livestock or green feed until 30 days after application. To avoid injury to subsequent crops after an application of recommended rates of Unity, the following recropping intervals should be observed.

Recropping Guidelines for Post-Emergent Use

Crop	Minimal Interval (Months)		
	Soil pH 6.4 or Less	Soil pH 6.5 - 7.4	Soil pH Greater than 7.5
Spring wheat (hard red, Canada Prairie extra strong)	No Restrictions	No Restrictions	No Restrictions
Durum wheat, barley, oats	10	10	10
Flax	10	10	22
Peas	10	22	22
Canola	10	22	34
Canary seed	22	22	22
Mustard	22	22	34
Lentils, sunflowers, all other crops	Bioassay	Bioassay	Bioassay

14. **Toxicity:**

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **If inhaled**, remove individual from site of exposure.

16. **Storage:**

    Unity 280EC will solidify at temperatures below -20 C but will become useable again at temperatures above 0 C. **Shake well before using.**

    Unity 75WG: Store above freezing. Prolonged storage at temperatures below 0 C may cause the soluble bag to become brittle.

17. **Weed Resistance:** Some naturally occurring biotypes of certain weeds listed on this label may not be controlled by the following herbicides: Unity, Logran, Amber, Ally, Express, Pack, Muster, Refine Extra, the DF component of Laser DF, and the Plus component of Triumph Plus. These populations are able to survive a use rate several times higher than needed to control susceptible populations. To delay selection of resistant populations, rotate the use of Unity, Logran, Amber, Ally, Express Pack, Muster, and Refine Extra with other herbicides effective on the same weeds. Avoid the use of Logran, Amber, Ally, Express Pack, Muster, and Refine Extra repeatedly in the same field. For information pertaining to the proper use of Laser DF and Triumph Plus to delay selection of resistant populations, please refer to their respective labels.

Vantage Plus/Vantage *(glyphosate)*

Group 9

Manufacturer: **Dow AgroSciences Canada Inc.**

CAUTION IRRITANT

1. **Formulations:**

   Vantage Plus: 360 g/L glyphosate acid equivalent (present as isopropylamine salt), 10 L.

   Vantage: 356 g/L glyphosate acid equivalent (present as isopropylamine salt), 10 L.

2. **Registered Mixes:**

   Zero till: Pardner + non-ionic surfactant.

   Chemical fallow: 2,4-D amine (or Banvel or Pardner) + non-ionic surfactant.

   Surfactants: Ag-Surf, Agral 90, Companion, Enhance, Frigate.

3. **Crops:** Prior to planting (all crops), fall stubble treatment, spot treatment (in-crop), non-crop areas, minimum or zero till cropping systems, pasture renovation, summer fallow, preharvest in flax (including linola), wheat, barley, oats, canola, lentils, peas, soybeans, dry beans, forages.

4. **Weeds Controlled:**

Annuals

- annual bluegrass (9.0)
- annual sow-thistle
- Canada fleabane
- cleavers
- common ragweed
- cow cockle
- dodder
- downy brome
- flixweed
- giant foxtail
- green foxtail
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarters
- large crabgrass
- narrow-leaved hawk's-beard
- narrow-leaved vetch
- Persian darnel
- prickly lettuce
- redroot pigweed
- Russian thistle
- shepherd's-purse
- stinkweed
- volunteer barley
- volunteer canola
- volunteer corn
- volunteer flax
- volunteer mustard
- volunteer wheat
- wild buckwheat (6.7)
- wild mustard
- wild oats

Perennials

- alfalfa
- Canada bluegrass
- Canada thistle (7.8)
- cattail
- common milkweed
- cottontop
- curled dock
- dandelion
- field bindweed
- foxtail barley
- hemp dogbane
- hoary cress
- Japanese knotweed
- Kentucky bluegrass
- perennial sow-thistle
- poison ivy
- Purple loosestrife
- quackgrass
- smooth bromegrass
- toadflax
- wormwood
- yellow nutsedge

Brush

- alder
- birch
- maple
- pine
- poplar
- raspberry
- sheep laurel
- snowberry
- willow

5. **Weeds Suppressed:** Some weeds suppressed at lower rates.

6. **When Used:**

   Annual weeds: Grassy and broadleaf weeds at least 15 cm tall and actively growing. Dodder: spot treatment in sugar beets.

   Perennial weeds:

   Canada thistle (bud stage): At or beyond bud stage of growth.

   Canada thistle (fall rosette): 15 cm in diameter and at least 5 weeks of growth. Majority of them in a rosette stage.

   Dandelion: Prior to seeding and post harvest.

   Field bindweed: At or beyond full bloom and actively growing.

Milkweed: Bud to full bloom stage of growth.

Note: Reduced results may occur on plants treated after full bloom.

Quackgrass (spring, summer fallow, preharvest, fall stubble): At least 20 cm in height (3 - 4 leaf stage) of growth and actively growing.

Quackgrass (fall tilled ground): Delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

Other perennials: Mostly in head and early bud stage.

Brush: Actively growing brush from June through August.

7. **How to Apply: Do not use galvanized steel or unlined steel tanks as a combustible gas may be formed.**

With: Ground equipment only: boom equipment, handgun, high volume equipment, wipers.

Rate:

Annual Weed Control

Rate L/ac	Growth stage	Weeds controlled	Comments (apply in 20 - 40 L/ac water)
0.3	- weeds up to 8 cm in height	- wild oats, green foxtail, volunteer barley, volunteer wheat, volunteer canola, wild mustard, lady's-thumb, stinkweed	- For wild oats, apply at 1 - 3 leaf stage. - Add 0.14 L of a surfactant registered for use such as Agral 90, Ag Surf and Companion. - For heavy wild oat infestations, use 0.4 L/ac rate.
0.4	- weeds 8 cm to 15 cm in height	- for annual grasses listed above plus foxtail barley* (suppression only), all other broad leaves listed above plus flixweed** and kochia**	- Add 0.14 L of surfactant registered for use as listed above. - Apply before initiation or senescence. **Suppression only.
0.51 - 0.77	- weeds up to 15 cm in height	- all annual grasses listed above plus downy brome, giant foxtail and Persian darnel - all annual broadleaved weeds listed above plus lamb's-quarters, redroot pigweed, hemp-nettle, flixweed, Russian thistle, volunteer flax, common ragweed*, Canada fleabane*, wild buckwheat**, narrow-leaved hawk's-beard***	- No additional surfactant is required. - ***Do not use** these rates on plants greater than 8 cm in height. - **For 3 - 4 leaf stage, use 0.77 L/ac rate. - ***For weeds 8 - 15 cm in height, use 0.77 L/ac rate.
0.91	- weeds up to 15 cm in height	- all annual grasses listed above, plus crab grass and annual blue grass - all broadleaved listed above plus kochia, prickly lettuce, shepherd's-purse, annual sow-thistle and narrow-leaved vetch	- For additional broadleaved weed control option, refer to tank mix table.
1.42	- weeds over 15 cm in height	- all annual grasses and broadleaved weeds listed above	- For additional broadleaved weed control option, refer to tank mix table.

Vantage Plus/Vantage *(glyphosate)*

Group 9

Manufacturer **Dow AgroSciences Canada Inc**

CAUTION IRRITANT

1. **Formulations:**

   Vantage Plus: 360 g/L glyphosate acid equivalent (present as isopropylamine salt), 10 L.

   Vantage: 356 g/L glyphosate acid equivalent (present as isopropylamine salt), 10 L.

2. **Registered Mixes:**

   Zero till: Pardner + non-ionic surfactant.

   Chemical fallow: 2,4-D amine (or Banvel or Pardner) + non-ionic surfactant.

   Surfactants: Ag-Surf, Agral 90, Companion, Enhance, Frigate.

3. **Crops:** Prior to planting (all crops), fall stubble treatment, spot treatment (in-crop), non-crop areas, minimum or zero till cropping systems, pasture renovation, summer fallow, preharvest in flax (including linola), wheat, barley, oats, canola, lentils, peas, soybeans, dry beans, forages.

4. **Weeds Controlled:**

[illegible]		[illegible]		[illegible]
annual bluegrass (9.0)	narrow-leaved vetch	alfalfa	hoary cress	alder
annual sow-thistle	Persian darnel	Canada bluegrass	Japanese knotweed	birch
Canada fleabane	prickly lettuce	Canada thistle (7.8)	Kentucky bluegrass	maple
cleavers	redroot pigweed	cattail	perennial sow-thistle	pine
common ragweed	Russian thistle	common milkweed	poison ivy	poplar
cow cockle	shepherd's-purse	cottontop	Purple loosestrife	raspberry
dodder	stinkweed	curled dock	quackgrass	sheep laurel
downy brome	volunteer barley	dandelion	smooth bromegrass	snowberry
flixweed	volunteer canola	field bindweed	toadflax	willow
giant foxtail	volunteer corn	foxtail barley	wormwood	
green foxtail	volunteer flax	hemp dogbane	yellow nutsedge	
hemp-nettle	volunteer mustard			
kochia	volunteer wheat			
lady's-thumb	wild buckwheat (6.7)			
lamb's-quarters	wild mustard			
large crabgrass	wild oats			
narrow-leaved hawk's-beard				

5. **Weeds Suppressed:** Some weeds suppressed at lower rates.

6. **When Used:**

   Annual weeds: Grassy and broadleaf weeds at least 15 cm tall and actively growing. Dodder: spot treatment in sugar beets.

   Perennial weeds:

   Canada thistle (bud stage): At or beyond bud stage of growth.

   Canada thistle (fall rosette): 15 cm in diameter and at least 5 weeks of growth. Majority of them in a rosette stage.

   Dandelion: Prior to seeding and post harvest.

   Field bindweed: At or beyond full bloom and actively growing.

Milkweed: Bud to full bloom stage of growth.

Note: Reduced results may occur on plants treated after full bloom.

Quackgrass (spring, summer fallow, preharvest, fall stubble): At least 20 cm in height (3 - 4 leaf stage) of growth and actively growing.

Quackgrass (fall tilled ground): Delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

Other perennials: Mostly in head and early bud stage.

Brush: Actively growing brush from June through August.

7. **How to Apply: Do not use galvanized steel or unlined steel tanks as a combustible gas may be formed.**

With: Ground equipment only: boom equipment, handgun, high volume equipment, wipers.

Rate:

Annual Weed Control

Rate L/ac	Growth stage	Weeds controlled	Comments (apply in 20 - 40 L/ac water)
0.3	- weeds up to 8 cm in height	- wild oats, green foxtail, volunteer barley, volunteer wheat, volunteer canola, wild mustard, lady's-thumb, stinkweed	- For wild oats, apply at 1 - 3 leaf stage. - Add 0.14 L of a surfactant registered for use such as Agral 90, Ag Surf and Companion. - For heavy wild oat infestations, use 0.4 L/ac rate.
0.4	- weeds 8 cm to 15 cm in height	- for annual grasses listed above plus foxtail barley* (suppression only), all other broad leaves listed above plus flixweed** and kochia**	- Add 0.14 L of surfactant registered for use as listed above. - Apply before initiation or senescence. **Suppression only.
0.51 - 0.77	- weeds up to 15 cm in height	- all annual grasses listed above plus downy brome, giant foxtail and Persian darnel - all annual broadleaved weeds listed above plus lamb's-quarters, redroot pigweed, hemp-nettle, flixweed, Russian thistle, volunteer flax, common ragweed*, Canada fleabane*, wild buckwheat**, narrow-leaved hawk's-beard***	- No additional surfactant is required. - ***Do not use** these rates on plants greater than 8 cm in height. - **For 3 - 4 leaf stage, use 0.77 L/ac rate. - ***For weeds 8 - 15 cm in height, use 0.77 L/ac rate.
0.91	- weeds up to 15 cm in height	- all annual grasses listed above, plus crab grass and annual blue grass - all broadleaved listed above plus kochia, prickly lettuce, shepherd's-purse, annual sow-thistle and narrow-leaved vetch	- For additional broadleaved weed control option, refer to tank mix table.
1.42	- weeds over 15 cm in height	- all annual grasses and broadleaved weeds listed above	- For additional broadleaved weed control option, refer to tank mix table.

Vantage Plus/Vantage (cont'd)

Annual Weed Control with Vantage Tank Mixtures for Summer fallow and Minimum Tillage Systems

Tank mixtures	Rate (per acre)	Weeds controlled	Comments (apply in 20 - 40 L/acre water and add 0.14 L/acre of surfactant)
Vantage + Banvel	0.3 L + 0.12 L	- volunteer cereals, wild oats, green foxtail, volunteer canola (rapeseed), wild mustard, flixweed*, lamb's-quarters, lady's-thumb, stinkweed, kochia, Russian thistle, cow cockle, redroot pigweed**, wild buckwheat**	- This tank mixture is registered for **summer fallow use only**. - Weeds should be less than 15 cm tall and actively growing for best results. Use higher rate if weeds are beyond 8 cm tall. - *Vantage is applied at 0.4 L/acre. - **Suppression only. See other tank mixtures for control option.
Vantage + Pardner	0.3 to 0.4 L + 0.5 L	- volunteer cereals, green foxtail, volunteer canola (rapeseed), wild mustard, lady's-thumb, stinkweed, wild buckwheat*, redroot pigweed**, kochia**, wild oats*	- This tank mixture is registered for **summer fallow use only** and prior to wheat, oats and barley in minimum tillage systems. Weeds should be at least 15 cm tall and actively growing for best results. - Use higher rate if weeds are beyond 8 cm in height. - *Use Vantage at 0.4 L/acre rate only for wild buckwheat control. - **0.4 L suppression only. See other tank mixtures for control option.
Vantage + 2,4-D amine	0.3 to 0.4 L + 0.48 L	- volunteer cereals, wild oats*, green foxtail*, volunteer canola (rapeseed), wild mustard, flixweed, redroot pigweed, lady's-thumb, stinkweed, kochia, lamb's-quarters, Russian thistle	- This tank mixture is registered for **summer fallow use only**. Weeds should be less than 15 cm tall and actively growing for best results. - Use higher rate if weeds are beyond 8 cm in height. - *Use Vantage at 0.4 L/acre for wild oats and green foxtail control. - **Suppression only. See other tank mixtures for control option.

Perennial Weed Control

Weed	Application			Comments
	Growth stage	Rate (L/ac)	Water volume (L/ac)	
Quackgrass (control, light to moderate infestations)	3 - 4 green leaves or more	1.0	20 - 120	- Allow 3 or more days after treatment before tillage. For higher water volumes (i.e. 60 - 120 L/ac), an approved surfactant must be added at 0.5 L per 100 L of clear water (0.5% V/V).
Quackgrass (long-term control, heavy infestations, high water volumes)	3 - 4 green leaves or more	1.0 to 2.8	20 - 120	- Allow 3 or more days after treatment before tillage. Rates higher than 1 L/ac will provide more consistent long-term control, especially with heavier infestations and/or higher water volumes (i.e. 60 - 120 L/ac).
Canada thistle	Rosette stage (summer fallow)	1.0	20 - 40	- Allow 10 or more days after treatment before tillage.
Canada thistle	Bud stage or beyond	1.9 to 2.8	20 - 120	- Allow 5 or more days after treatment before tillage.
Field bindweed	Full bloom or beyond	1.9 to 2.8	20 - 120	- Allow 7 or more days after treatment before tillage.
Common milkweed	Bud to full bloom Bud to full bloom (preharvest)	4.9 1.0	20 - 120 20 - 100	- Allow 7 or more days after treatment before tillage. Reduced control may occur after full bloom. Milkweed may not be present in a correct stage; therefore, repeat treatment may be required.
Toadflax	Vegetative stage (summer fallow) Bud to full bloom (preharvest)	1.0	20 - 40	- Allow 7 or more days after treatment before tillage.
Alfalfa	Early bud to full bloom stage Fall applications only	1.5 to 2.0	20 - 120	- Allow 5 or more days after treatment before tillage. Use the higher rates when alfalfa populations are high or when heavy grass infestations are also present. - For spring applications and control in minimum tillage systems using a 2,4-D tank mix, see section 8.
Dandelion	< 15 cm > 15 cm Rosette to full bloom (preharvest)	1.0 1.5 to 2.0 1.0	20 - 40 20 - 40 20 - 40	- Allow 3 or more days after treatment before tillage for all rates. Use the higher rates when infestations are heavy. - Allow 7 or more days after preharvest treatment before tillage.
Foxtail barley	Seedling to heading	1.0 to 2.0	20 - 40	- Allow a minimum of 1 day after treatment before tillage or seeding. Use higher rate for larger, more established plants, heavy infestations or if plants are stressed.

Preplant or preseed application in direct seeding systems (all crops): 0.5 - 0.75 L/ac annual weeds up to 15 cm in height. Apply prior to seeding or after seeding, but before crop emergence for control of emerged weeds in direct seeding systems. Ensure weeds are at the desired stage at time of application. This product does not provide pre-emergent weed control, and newly germinating weeds may be a problem in the crop.

Perennial Weed Control

Weed	Application			Comments
	Growth stage	Rate (L/ac)	Water volume (L/ac)	
Quackgrass (control, light to moderate infestations)	3 - 4 green leaves or more	1.0	20 - 120	- Allow 3 or more days after treatment before tillage. For higher water volumes (i.e. 60 - 120 L/ac), an approved surfactant must be added at 0.5 L per 100 L of clear water (0.5% V/V).
Quackgrass (long-term control, heavy infestations, high water volumes)	3 - 4 green leaves or more	1.0 to 2.8	20 - 120	- Allow 3 or more days after treatment before tillage. Rates higher than 1 L/ac will provide more consistent long-term control, especially with heavier infestations and/or higher water volumes (i.e. 60 - 120 L/ac).
Canada thistle	Rosette stage (summer fallow)	1.0	20 - 40	- Allow 10 or more days after treatment before tillage.
Canada thistle	Bud stage or beyond	1.9 to 2.8	20 - 120	- Allow 5 or more days after treatment before tillage.
Field bindweed	Full bloom or beyond	1.9 to 2.8	20 - 120	- Allow 7 or more days after treatment before tillage.
Common milkweed	Bud to full bloom	4.9	20 - 120	- Allow 7 or more days after treatment before tillage. Reduced control may occur after full bloom. Milkweed may not be present in a correct stage; therefore, repeat treatment may be required.
	Bud to full bloom (preharvest)	1.0	20 - 100	
Toadflax	Vegetative stage (summer fallow) Bud to full bloom (preharvest)	1.0	20 - 40	- Allow 7 or more days after treatment before tillage.
Alfalfa	Early bud to full bloom stage Fall applications only	1.5 to 2.0	20 - 120	- Allow 5 or more days after treatment before tillage. Use the higher rates when alfalfa populations are high or when heavy grass infestations are also present. - For spring applications and control in minimum tillage systems using a 2,4-D tank mix, see section 8.
Dandelion	< 15 cm	1.0	20 - 40	- Allow 3 or more days after treatment before tillage for all rates. Use the higher rates when infestations are heavy
	> 15 cm	1.5 to 2.0	20 - 40	
	Rosette to full bloom (preharvest)	1.0	20 - 40	- Allow 7 or more days after preharvest treatment before tillage.
Foxtail barley	Seedling to heading	1.0 to 2.0	20 - 40	- Allow a minimum of 1 day after treatment before tillage or seeding. Use higher rate for larger, more established plants, heavy infestations or if plants are stressed.

Preplant or preseed application in direct seeding systems (all crops): 0.5 - 0.75 L/ac annual weeds up to 15 cm in height. Apply prior to seeding or after seeding, but before crop emergence for control of emerged weeds in direct seeding systems. Ensure weeds are at the desired stage at time of application. This product does not provide pre-emergent weed control, and newly germinating weeds may be a problem in the crop.

Vantage Plus/Vantage (cont'd)

Water volume: Handgun, high volume (coarse sprays only): 80 - 120 L/ac. Boom: 20 - 120 L/ac. Chemical fallow, reduced rates: 20 - 40 L/ac. Always use clean water, free of sediments.

Pressure: 275 kPa.

Nozzles: Flat fan nozzles for volumes 20 - 40 L/ac: flood jet type or flat fan for volumes above 40 L/ac.

8. **Application Tips:** Tillage or mowing prior to application will reduce effectiveness on perennial weeds. Minimum (days) to wait before tillage after Vantage applications: annual weeds (1); spring and fall quackgrass (3); Canada thistle bud stage (5), fall rosette stage (7 - 10); field bindweed, milkweed, other perennials (7). Before commencing tillage, allow at least 3 full days (72 hours) after application for quackgrass control and 5 - 7 days after application for thistles if applied other than at early bud stage.

Quackgrass control:

Spring and fall treatments in annual and forage cropping systems: Apply to actively growing quackgrass. Reduced control may result if rhizomes become dormant. This may occur when soil fertility is poor or land has not been tilled for several years.
Application on forages should be followed by tillage and should be made when good growing conditions exist.
Fall treatments should be applied 3 - 4 weeks after swathing to actively growing quackgrass.Quackgrass can be treated after mild frost provided there are 3 - 4 green leaves actively growing at the time of application. Do not apply after first damaging frost in the fall. Frost of -5°C is usually tolerated by new shoots. Frost damage is evident by the drying of new shoots shortly after frost.
Allow 3 or more days after application before tillage.
For best results on fall tilled ground, delay application in the spring until majority of quackgrass has 4 - 5 leaves. This stage usually occurs 1 - 4 weeks later on fall tilled ground than on undisturbed ground.

Canada thistle (fall rosette): Conduct summer fallow tillage as usual and perform last tillage operation between July 15 and August 1. Allow thistles to regrow for a minimum of 5 weeks until they are 15 cm in diameter and majority of them are in a rosette stage.

Toadflax: To ensure the proper timing, conduct summer fallow tillage as usual and perform the last tillage operation from July 15 to July 21. Allow toadflax to regrow for a minimum of four weeks following last tillage. When the toadflax reach the height of 15 cm and have a large number of green leaves, apply 1.0 L/ac. Wait a minimum of 7 days after application before tilling again.

Note: Canada thistle and toadflax can be treated after a mild frost provided the leaves are still green and actively growing at the time of application. Do not treat after first killing frost.

Alfalfa ploughdown (fall application only): Apply 1.5 L/ac at early bud to full bloom stage. Allow 5 or more days after treatment before tillage. Use the higher rate when alfalfa populations are high or when heavy grass infestations are present.

Alfalfa control with 2,4-D tank mix: For fall control of established stands of alfalfa, apply 1 - 2 L/ac of Vantage + 0.48 - 0.97 L/ac of any 500 g/L of 2,4-D amine or ester in 40 - 80 L/ac of water. For spring applications, use only the low rate of 2,4-D and 1 - 2 L/ac of Vantage. Only cereal crops not underseeded to legumes may be planted following spring applications of this tank mix. A 14 day interval between application and planting is required. Use the higher Vantage rates when perennial grasses are prevalent.

9. **How it Works:** A non-selective, systemic herbicide that moves from the foliage into the roots and kills the entire plant.

10. **Expected Results:** Wilting and yellowing of annuals occurs within 2 - 4 days; perennials require 7 - 10 days. Complete browning of above ground growth and deterioration of roots occurs. Cool or cloudy weather may slow activity.

11. **Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application.

12. **Movement in Soil:** The amount of glyphosate leaching is very low.

13. **Grazing and Cropping Restrictions:** All portions of the treated crops may be fed to livestock.

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (4,320). Eye irritant. Non-toxic to bees, birds and fish.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage not required.

Preharvest Vantage Plus/Vantage

Application may be made prior to harvest for the control of quackgrass, Canada thistle, common milkweed, toadflax, dandelion, season-long control of perennial sow-thistle and most annual weeds.

Crop: Wheat, barley (including malting barley), canola (rapeseed), dry beans, flax (including low linolenic acid varieties), lentils, oats, peas, forages and soyabean.

Rate:

Vantage Plus/Vantage: 1 L/ac.

Forage crops only: Vantage Plus/Vantage: 1 - 2 L/ac.

With: Ground equipment only.

Crop timing: For annual crops, apply when average seed moisture content is at or below 30%. Accurate measurement of seed moisture content must be made before application. This stage typically occurs 7 - 14 days before harvest. For forage crops, apply at 1 - 2 L/ac 3 - 7 days prior to the last cut before rotation or forage renovation. Consult the table below for visual indicators of this stage in each crop.

[illegible]

[illegible]	[illegible]	[illegible]
Canola	less than 30%	Pods are green to yellow and most seeds are yellow to brown
Dry beans	less than 30%	Stems are green to brown; pods are mature (yellow to brown); 80% - 90% leaf drop (original leaves)
Flax (not including low linolenic acid varieties)	less than 30%	Majority 75% - 80% of bolls are brown
Forages	not applicable	Normal stage for forage harvesting
Lentils	less than 30%	Lowermost pods (bottom 15%) are brown and seeds rattle
Peas	less than 30%	Majority 75% - 80% of pods are brown
Soybeans	less than 30%	Stems are green to brown; pod tissue is dry and brown in appearance (80 - 90% leaf drop)
Wheat, barley, oats	less than 30%	Hard dough stage: a thumbnail impression remains on the seed

Weeds controlled: Canada thistle, common milkweed, dandelion, perennial sow-thistle (season-long), quackgrass, toadflax and most of the annual weeds.

Weed stage: For best weed control results, apply when quackgrass is actively growing and has at least 4 - 5 green leaves. For best results, Canada thistle and perennial sow-thistle should be actively growing and at or beyond the bud stage.

Application tip: This treatment may also provide harvest management benefits by drying down crop and vegetative crop growth and late tillering that may interfere with harvest operations. Apply only during the period 7 - 14 days (or 3 - 7 days for forage applications) before harvest to ensure best weed control and to maximize harvest-aid benefits. Earlier application may reduce crop yield and/or quality and may lead to excess glyphosate residues in the crop. Extremely cool, wet and/or cloudy weather between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry down and harvest date.

Caution:

Do not apply to any crops if grown for seed.
Consult malt buyers before using preharvest on malt barley.
All portions of the treated crops may be fed to livestock.

15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Heated storage not required.

Preharvest Vantage Plus/Vantage

Application may be made prior to harvest for the control of quackgrass, Canada thistle, common milkweed, toadflax, dandelion, season-long control of perennial sow-thistle and most annual weeds.

Crop: Wheat, barley (including malting barley), canola (rapeseed), dry beans, flax (including low linolenic acid varieties), lentils, oats, peas, forages and soyabean.

Rate:

Vantage Plus/Vantage: 1 L/ac.

Forage crops only: Vantage Plus/Vantage: 1 - 2 L/ac.

With: Ground equipment only.

Crop timing: For annual crops, apply when average seed moisture content is at or below 30%. Accurate measurement of seed moisture content must be made before application. This stage typically occurs 7 - 14 days before harvest. For forage crops, apply at 1 - 2 L/ac 3 - 7 days prior to the last cut before rotation or forage renovation. Consult the table below for visual indicators of this stage in each crop.

Guidelines for timing of pre-harvest applications

Crop(s)	Per cent grain moisture	Visual symptoms
Canola	less than 30%	Pods are green to yellow and most seeds are yellow to brown
Dry beans	less than 30%	Stems are green to brown; pods are mature (yellow to brown); 80% - 90% leaf drop (original leaves)
Flax (not including low linolenic acid varieties)	less than 30%	Majority 75% - 80% of bolls are brown
Forages	not applicable	Normal stage for forage harvesting
Lentils	less than 30%	Lowermost pods (bottom 15%) are brown and seeds rattle
Peas	less than 30%	Majority 75% - 80% of pods are brown
Soybeans	less than 30%	Stems are green to brown; pod tissue is dry and brown in appearance (80 - 90% leaf drop)
Wheat, barley, oats	less than 30%	Hard dough stage: a thumbnail impression remains on the seed

Weeds controlled: Canada thistle, common milkweed, dandelion, perennial sow-thistle (season-long), quackgrass, toadflax and most of the annual weeds.

Weed stage: For best weed control results, apply when quackgrass is actively growing and has at least 4 - 5 green leaves. For best results, Canada thistle and perennial sow-thistle should be actively growing and at or beyond the bud stage.

Application tip: This treatment may also provide harvest management benefits by drying down crop and vegetative crop growth and late tillering that may interfere with harvest operations. Apply only during the period 7 - 14 days (or 3 - 7 days for forage applications) before harvest to ensure best weed control and to maximize harvest-aid benefits. Earlier application may reduce crop yield and/or quality and may lead to excess glyphosate residues in the crop. Extremely cool, wet and/or cloudy weather between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry down and harvest date.

Caution:

Do not apply to any crops if grown for seed.
Consult malt buyers before using preharvest on malt barley.
All portions of the treated crops may be fed to livestock.

Velpar L, Velpar DF *(hexazinone)*

CAUTION FLAMMABLE

Manufacturer: **DuPont Canada Inc.**

1. **Formulations:** Water Dispersible Solution: Velpar L; 240 g/L; 10 L jugs. Water Dispersible Granule: Velpar DF; 75%, 2.0 kg bag.
2. **Registered Mixes:** None.
3. **Crops:**

   Velpar L: Established seed alfalfa for selective weed control. Non-crop areas as an industrial herbicide for total vegetation control. Forestry use for weed and deciduous brush control in coniferous woodland plantations [fir (balsam), pine (red), spruce (black, white)]. Velpar L used for weed and deciduous brush control in coniferous woodland plantations [fir (balsam), pine (red), spruce (black, white)].

   Velpar DF: Woodland management areas less than 50 hectars, Christmas tree plantations (balsam fir, red pine, scotch pine, black spruce, white spruce, Colorado blue spruce), established seed alfalfa, blueberries.
4. **Weeds Controlled:**

   Alfalfa: Dandelion, quackgrass, sow-thistle, narrow-leaved hawk's-beard, scentless chamomile.

   Non-crop

   bedstraw
   bindweed, field
   bromegrass
   burdock
   campion, bladder
   carrot, wild
   dandelion
   dogbane, spreading
   goldenrod
   grape, wild
   grasses (annual, perennial)
   ground-ivy
   hemp-nettle
   horsetail
   lamb's-quarters
   milkweed
   mullein
   poison-ivy
   ragweed, common
   ragwort, tansy
   raspberry, wild
   spurge, Cypress
   thistle, Canada
   toadflax
   vetch, purple
   vine trumpet

   Forestry: Ash, birch, cherry, maple, poplar (aspen).
5. **Weeds Suppressed:** None.
6. **When Used:**

   Established seed alfalfa:

   Velpar L: Apply in late fall or early spring when alfalfa is dormant. It must be seed alfalfa established for at least 18 months.

   Non-crop (herbaceous weed control):

   Velpar L and Velpar DF: Just before or soon after weed emergence. Do not apply to frozen or snow covered soil or soil with less than 1% soil organic matter.

   Forestry:

   Conifer site preparation (Velpar L): In spring after ground has thawed.

   Undiluted spot treatment for brush (Velpar L): To thawed ground in spring or early summer.

   Blueberry: In spring after burning operations but before blueberries emerge.
7. **How to Apply:**

   Established seed alfalfa:

   With: Ground equipment.

   Rate:

   Velpar L: 0.85 - 1.7 L/ac. Applied to dormant, established alfalfa.

   Velpar DF: 272 - 544 g/ac.

   Blueberry: Velpar DF: 777 gm - 1.04 kg/ac.

Velpar L, Velpar DF *(hexazinone)*

CAUTION FLAMMABLE

Manufacturer: **DuPont Canada Inc.**

1. **Formulations:** Water Dispersible Solution; Velpar L; 240 g/L; 10 L jugs. Water Dispersible Granule; Velpar DF; 75%, 2.0 kg bag.
2. **Registered Mixes:** None.
3. **Crops:**

   Velpar L: Established seed alfalfa for selective weed control. Non-crop areas as an industrial herbicide for total vegetation control. Forestry use for weed and deciduous brush control in coniferous woodland plantations [fir (balsam), pine (red), spruce (black, white)]. Velpar L used for weed and deciduous brush control in coniferous woodland plantations [fir (balsam), pine (red), spruce (black, white)].

   Velpar DF: Woodland management areas less than 50 hectars, Christmas tree plantations (balsam fir, red pine, scotch pine, black spruce, white spruce, Colorado blue spruce), established seed alfalfa, blueberries.
4. **Weeds Controlled:**

   Alfalfa: Dandelion, quackgrass, sow-thistle, narrow-leaved hawk's-beard, scentless chamomile.

   [illegible]

   bedstraw
   bindweed, field
   bromegrass
   burdock
   campion, bladder
   carrot, wild
   dandelion
   dogbane, spreading
   goldenrod
   grape, wild
   grasses (annual, perennial)
   ground-ivy
   hemp-nettle
   horsetail
   lamb's-quarters
   milkweed
   mullein
   poison-ivy
   ragweed, common
   ragwort, tansy
   raspberry, wild
   spurge, Cypress
   thistle, Canada
   toadflax
   vetch, purple
   vine trumpet

   Forestry: Ash, birch, cherry, maple, poplar (aspen).
5. **Weeds Suppressed:** None.
6. **When Used:**

   Established seed alfalfa:

   Velpar L: Apply in late fall or early spring when alfalfa is dormant. It must be seed alfalfa established for at least 18 months.

   Non-crop (herbaceous weed control):

   Velpar L and Velpar DF: Just before or soon after weed emergence. Do not apply to frozen or snow covered soil or soil with less than 1% soil organic matter.

   Forestry:

   Conifer site preparation (Velpar L): In spring after ground has thawed.

   Undiluted spot treatment for brush (Velpar L): To thawed ground in spring or early summer.

   Blueberry: In spring after burning operations but before blueberries emerge.
7. **How to Apply:**

   Established seed alfalfa:

   With: Ground equipment.

   Rate:

   Velpar L: 0.85 - 1.7 L/ac. Applied to dormant, established alfalfa.

   Velpar DF: 272 - 544 g/ac.

   Blueberry: Velpar DF: 777 gm - 1.04 kg/ac.

Water volume: 81 L/ac.

Pressure: 210 kPa.

Nozzles: Flat fan recommended.

Non-crop and forestry:

With:

Velpar L: Fixed boom sprayer, handgun, back pack sprayers, a watering can for smaller areas or a spot gun.

Velpar DF: By air (forestry only). Fixed or rotary wing, minimum droplet size: 200 micometers UMD (optimum droplet size 400 micometers).

Rate:

Velpar DF: Air: 1.17 - 2.33 kg/ac in 14 L/ac of water. Ground: 1.17 - 2.33 kg/ac in 100 L/ac of water (min).

More than 1 season: 1.8 - 3.6 kg/ac as a foliar spray. Higher rates on clay or clay loam soils and on soils with more than 5% organic matter.

Velpar L:

Conifer site preparation: 3.6 - 7.2 L/ac. Black or white spruce and jack pine may be planted immediately after the 3.6 L/ac application, but should **not** be planted until a year after application at higher rates.

Undiluted spot treatment for brush: 0.75 - 1.50 mL for each 1 cm of stem diameter (breast height) of plants to be controlled. Direct treatment within 0.5 m of the root collar of plants to be controlled and at least 1.0 m from desirable conifers.

Water volume: Handgun, minimum of 650 L/ac of spray solution. Velpar L: at least 5 L of water for each litre of Velpar L.

8. **Application Tips:** Avoid overlapping spray swaths. **Do not apply to slopes as soil erosion may occur.** Do not apply when vegetation is dormant or semi-dormant as the treatment may not be effective. Do not use on gravelly or rocky soils, exposed subsoil or sandy soils. Since the effect on conifers varies with soil type, uniformity of application and environmental conditions, it is suggested growers first test Velpar L or DF on small areas.
9. **How it Works:** A systemic herbicide readily absorbed through the roots and foliage and translocated upwards. Inhibits photosynthesis.
10. **Expected Results:** Plants become chlorotic soon after treatment and then die. Rainfall will increase efficacy. **Poor results may be expected if** there is inadequate application rate, weed growth too mature, insufficient rainfall or application on areas subject to severe soil erosion.
11. **Effects of Rainfall:** Rainfall less than 4 hours after application may affect the contact activity.
12. **Movement in Soil:** Velpar moves downward in the soil to the root zone of woody species.
13. **Grazing and Cropping Restrictions:**

    Alfalfa: Do not graze the treated crop or cut for hay; there is insufficient data available to support such use. Do not seed any crop following alfalfa that has been treated with Velpar L until a successful field bioassy shows that the crop in question may be grown safely. A successful field bioassy means growing a test strip of the crop to maturity across the field. Persistence of Velpar L or DF in the soil is influenced by temperature, rainfall, soil type and organic matter. Seeding of field bioassys is not recommended less than 24 months after the last Velpar application.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (1,690). May cause some eye irritation. Slightly toxic to fish. Velpar irritates eyes.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place. Keep away from heat, sparks and open flame.

Venture 25DG *(fluazifop-p-butyl)*

Group 1

Manufacturer: **Zeneca Agro**

1. **Formulations:**

   Venture 25DG: Dispersible grain; 25%; 6.4 kg. Turbocharge (Adjuvant); 1 - 8 L jugs.

2. **Registered Mixes:** Ally, 2,4-DB (alfalfa, bird's-foot trefoil, red clover), Lontrel (all canola including T.T.C. and Rapeseed), Bladex (T.T.C. canola only), Muster (Argentine varieties only), Pursuit, Liberty.

   Mixing instructions: Recommended mixing order: Venture 25DG first, followed by Broadleaf herbicide, always add Turbocharge adjuvant last.

3. **Crops:** Canola (8.6), peas (field), lentils, flax (8.9), fescue*, creeping red (seedling and established), alfalfa (8.8), red clover*, bird's-foot trefoil* (7.4), linola, mustard, sunflowers.

   * For seed production only. Do not graze or harvest for feed in year of treatment.

4. **Weeds Controlled:**

   barley (8.4)
   corn (volunteer)
   darnel Persian (6.8)
   foxtail [green (8.4), yellow]
   barnyard grass (7.5)
   wild oats (8.2)
   wheat [volunteer, spring (8.4)]
   wild proso millet

5. **Weeds Suppressed:** Quackgrass.

6. **When Used:** Apply to actively growing, grassy weeds.

   Annual grasses: Full 2 - 5 leaf stage*.

   Foxtails: Full 2 - 4 leaf stage.

   Quackgrass: 3 - 5 leaf stage, maximum 20 cm tall, not heading.

   * Most effective control of wild oats is achieved when application is made before tillering.

7. **How to Apply:**

   With: Ground equipment only.

   Water volume: 22 - 45 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan type. 50 mesh or larger screens.

   Rate: Maximum use rate 280 g/ac.

Grass Weed Species Controlled	Rate (g/ac)
Volunteer Corn	120
Wild oats Volunteer barley Volunteer wheat Persian darnel Barnyard grass	160
Quackgrass suppression (canola) Wild proso millet	200
Quackgrass suppression (all crops) Green and yellow foxtail	280

Add turbocharge adjuvant at a rate of 0.5 L/100 L spray solution (2 L/454 L).

Venture 25DG *(fluazifop-p-butyl)*

Group 1

Manufacturer **Zeneca Agro**

1. **Formulations:**

   Venture 25DG: Dispersible grain; 25%; 6.4 kg, Turbocharge (Adjuvant); 1 - 8 L jugs.

2. **Registered Mixes:** Ally, 2,4-DB (alfalfa, bird's-foot trefoil, red clover), Lontrel (all canola including T.T.C. and Rapeseed), Bladex (T.T.C. canola only), Muster (Argentine varieties only), Pursuit, Liberty.

   Mixing instructions: Recommended mixing order: Venture 25DG first, followed by Broadleaf herbicide, always add Turbocharge adjuvant last.

3. **Crops:** Canola (8.6), peas (field), lentils, flax (8.9), fescue*, creeping red (seedling and established), alfalfa (8.8), red clover*, bird's-foot trefoil* (7.4), linola, mustard, sunflowers.

   * For seed production only. Do not graze or harvest for feed in year of treatment.

4. **Weeds Controlled:**

   barley (8.4)
   corn (volunteer)
   darnel Persian (6.8)
   foxtail [green (8.4), yellow]
   barnyard grass (7.5)
   wild oats (8.2)
   wheat [volunteer, spring (8.4)]
   wild proso millet

5. **Weeds Suppressed:** Quackgrass.

6. **When Used:** Apply to actively growing, grassy weeds.

   Annual grasses: Full 2 - 5 leaf stage*.

   Foxtails: Full 2 - 4 leaf stage.

   Quackgrass: 3 - 5 leaf stage, maximum 20 cm tall, not heading.

   * Most effective control of wild oats is achieved when application is made before tillering.

7. **How to Apply:**

   With: Ground equipment only.

   Water volume: 22 - 45 L/ac.

   Pressure: 275 kPa.

   Nozzles: Flat fan type. 50 mesh or larger screens.

   Rate: Maximum use rate 280 g/ac.

[illegible]	[illegible]
Volunteer Corn	120
Wild oats Volunteer barley Volunteer wheat Persian darnel Barnyard grass	160
Quackgrass suppression (canola) Wild proso millet	200
Quackgrass suppression (all crops) Green and yellow foxtail	280

Add turbocharge adjuvant at a rate of 0.5 L/100 L spray solution (2 L/454 L).

Mixing instructions:

1. Only use sprayers in good running condition with high agitation. Ensure the sprayer is cleaned according to instructions on label of the product used prior to Venture 25DG.
2. Add 3/4 required amount of water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Do not enlarge the opening of the Venture 25DG carton. Remove strainer screen from filler opening of spray tank. Add Venture 25DG slowly. (**Note:** Venture 25DG must be added directly into the sprayer through the tank opening and not through injector of hopper systems for sprayers so equipped). For shallow spray tanks where water depth is 60 cm (24 inches) or less, add Venture 25DG towards agitator unit and away from outlet in the bottom of the tank to enhance dispersion. If more than one case of Venture 25DG is to be used, add Venture 25DG from all cases first prior to adding broadleaf herbicide or Turbocharge adjuvant.
3. Wait at least one minute after the last of the Venture 25DG has been added to the tank, allowing for complete dispersion of the granules. A longer agitation period may be required to disperse Venture 25DG when using cold water (less than 5°C) from sources such as deep wells.
4. If tank mixing, add the recommended herbicide next.
5. Lastly, add Turbocharge adjuvant, and then continue to fill the tank to the desired level with water.
6. Always ensure the agitation is running until spraying is completed, even if stopped for brief periods of time. If agitation is stopped for more that 5 minutes, re-suspend spray solution by full agitation prior to respraying.

Note: Venture 25DG must be sprayed within the same day of mixing.

8. **Application Tips:** Application made to annual grasses that have tillered and are under moisture and/or temperature stress will not provide acceptable control. Fragmenting quackgrass rhizomes by tillage in fall or spring, prior to seeding, will enhance quackgrass control. Crop competition generally enhances control of quackgrass. Do not cultivate for 5 days after applying.

   Sequential applications: Always apply Venture 25DG first and allow at least 3 days before applying the other herbicide. Where Muster is to be used in sequence with Venture 25DG, apply Muster first and wait at least 4 days before applying Venture 25DG.

   Pursuit tankmix: To control grass and broadleaf weeds in field peas, a tankmix of Venture 25DG and Pursuit can be used. Use 280 g/ac of Venture 25DG with 85 mL/ac of Pursuit in 40 L/ac of water. Turbocharge adjuvant must be added to the spray solution to give a final strength of 0.5% v/v (0.5 L for each 100 L of spray solution). Turbocharge must be added to the spray tank last. Tank mix of Venture 25DG with Pursuit may result in up 10% reduction of grass control.
   Apply this tankmix only to grass that has not begun to tiller and are under optimum growing conditions. This tankmix will result in reduced grass control (particularly wild oats) if it is applied to grasses that have started to tiller and are under any kind of weather related stress conditions.
   Refer to the Pursuit label for proper weed growth stages and timing of the tankmix application.

   Liberty tankmix: Refer to the Libety label for proper use rates, weed growth stages and timing of the tankmix application.

9. **How it Works:** Systemic, readily translocated from leaf surface to the growing points where it starts killing the grasses. Translocation also carries Venture 25DG to the roots and rhizomes to help prevent regrowth and to add to the control of perennial grasses.
10. **Expected Results:** Grass growth stops in 48 hours. Young shoots turn brown in 7 - 8 days, and complete kill takes place over a 3 - 4 week period.
11. **Effects of Rainfall:** No effect 2 hours after application.
12. **Movement in Soil:** No soil movement. This product will not leach in the soil.
13. **Grazing and Cropping Restrictions:** Do not harvest red clover, bird's-foot trefoil or creeping red fescue for feed or graze livestock in the year of treatment. Alfalfa (treated crop) and field peas (straw) may be fed to lactating dairy animals and other livestock 41 days (alfalfa) or 66 days (field peas) after treatment.

    Minimum harvest interval to harvest (days): Canola, flax (80), lentils (70), mustard (75), peas (field) (66), alfalfa (41).

    Succeeding crops: Seed only broadleaf crops listed on this label if it is necessary to reseed a crop within 60 days of applying Venture 25DG.

Venture 25DG (cont'd)

14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mL/kg) = (4,770). May cause eye and severe skin irritation.
15. **Precautions, First Aid:** When spraying, avoid spray mist by staying upwind from the spray and/or by wearing a suitable mask or respirator. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in a cool, dry place. Keep packages dry at all times. Product is not affected by freezing.

Weedone CB *(2,4-D + dichlorprop)*

Group 4

Manufacturer **Nufarm**

WARNING POISON

1. **Formulations:** Ready-to-apply formulation; 80 g/L 2,4-D + 80 g/L dichlorprop; 10 L jug.
2. **Registered Mixes:** None.
3. **Crops:** Non-crop areas (fence rows, industrial areas, rights-of-way, roadsides), forest, woodlands.

   Underseeding: Not applicable.
4. **Weeds Controlled:**

   alder (red, speckled)
   ash (green, white*)
   basswood (American)
   beech (American)
   birch (gray,* white)
   cherry (black, choke, pin)
   elm (American, red)
   hawthorn
   honeysuckle
   ironwood
   maple (Manitoba, red*, sugar silver*)
   oak (bur, red, white)
   poplar (aspen, balsam)
   rose, wild
   snowberry, western
   sumac
   walnut
   willows

   * With basal bark applications, treat at least 100 cm of the stem of these species.
5. **Weeds Suppressed:** None.
6. **When Used:** Year round, will not freeze during storage or application.
7. **How to Apply:**

   With: Knapsack sprayer.

   Rate: 20 L/ac normally. Rate depends on amount and size of brush being treated. Basal bark applications normally require less than 5 mL/stem.

   Water volume: None, ready-to-apply formulation. Spray bark until wet only, rather than to runoff.

   Pressure: 100 kPa is optimal for most applications. Do not use over 140 kPa.

   Nozzles: Spraying Systems 5500 adjustable ConeJet nozzles with Y series orifices, 200 mesh screens.
8. **Application Tips:** Weedone CB may affect O rings and other seals in certain sprayer units. The most effective method of minimizing this problem is to drain the sprayer completely every evening. Weedone CB can be returned to the original container. Do not allow contact with desirable vegetation.

   Basal bark applications: Apply to lower 50 - 100 cm of plant stem. Treat all around the stem including root collar and any exposed roots. It is not necessary to use so much product that it puddles at the root collar. Use the stump treatment for any plant with a diameter of more than 10 cm at breast-height.

   Stump applications: Control stems with a breast-height diameter of more than 10 cm by cutting the tree and thoroughly treating the bark, root collar and any exposed roots of the remaining stump. The stumps can be any height as long as all the remaining wood, bark and roots are thoroughly treated. Stumps do not require immediate treatment, permitting separate cut and spray operations for greater efficiency.

9. **How it Works:** Contains a penetrant which allows the herbicide to be effectively absorbed through the bark. It is not necessary to cut or frill prior to application.
10. **Expected Results:** Spring or summer applications will cause leaves to brown and wilt that season; no leaves appear the following year. Fall or winter treated stems may briefly leaf out in the following season but will die shortly afterwards. Herbacious plants may die around base of brush sprayed.
11. **Effects of Rainfall:** None.
12. **Movement in Soil:** Leaching does not pose a problem.
13. **Grazing and Cropping Restrictions:** For use in non-crop areas only. Do not graze treated area or cut for hay; there is insufficient data to support such use.
14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = Toxic to fish. Can be absorbed through skin and cause burns to skin and eyes.
15. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron and respirator when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.
16. **Storage:** Store in tightly closed constainers. Not damaged by freezing.

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Chemical Insect Control in Alberta

The degree of infestation and the severity of insect damage vary drastically from area to area and season to season. Most pests, such as grasshoppers, cutworms, and Bertha armyworms, require control during periods of abundance that may last from one to several years. Other pests, like flea beetles, require control annually in some parts of Alberta.

To ensure proper use of insecticides, identify the pest, learn its biology, check your fields and do not panic when you see an insect in your crop. Obtain information on pending pest problems and keep in mind the previous years' problems, so you are prepared for changes in insect population levels.

Chemical control

Attention to the following points should lead to more effective control once a decision to apply an insecticide is made. Insecticides will kill the pest insect if applied properly at a stage when the pest is susceptible. An application made too early or too late in the life cycle may not provide adequate control and would be wasteful. Follow label instructions for proper application. Consider factors like penetration through foliage, weather conditions, age and size of the insect, wait period to grazing or harvest and dosage required when making an application decision. If insects are moving into crops or emerging over an extended period, several applications in the same season may be necessary since most insecticides have limited residual properties when applied to foliage.

Safety

In general, insecticides are more toxic to humans, wildlife, fish, bees and other non-target organisms than herbicides or fungicides. Follow label directions for safety precautions associated with application of each insecticide. Refer to the introductory section of this book for general information on pesticide toxicity, exposure, safety precautions, protective equipment, symptoms, first aid, poison control centres and disposal. Specific information on safety is included with each insecticide.

Bee safety

The insecticides used to protect crops from damaging outbreaks of insect pests can also kill some beneficial insects. The problem facing the applicator is one of how to remove the problem insects from the crop with the least possible impact to beneficial insects such as honeybees, leafcutter bees and other insects. Because bees play such an important role in pollinating some crops, neither beekeepers nor producers want to see them harmed. Although it may not be possible to totally eliminate the impact of insecticides on beneficial insects, their impact can be greatly reduced when agricultural producer, pesticide applicator and the beekeeper work together.

Beekeepers should:

- Talk with the landowners near their bee yards before spray season and provide the producers with their phone number.
- Ask producers if spraying to control insects is likely this year.
- Request the producer provide them with notification 48 hours in advance of applying an insecticide.

Producers and Applicators should:

- Check for potential insect infestations in field crops early and frequently and determine what the economic thresholds are for problem insects so that a spray program can be planned should it be required.
- Notify beekeepers of intentions to spray 48 hours in advance of spraying.
- Avoid application of insecticides to crops in bloom or to fields containing blooming weeds which are attractive to foraging bees. Where feasible, use a preventative program early in the season when insecticides may be as effective and crops are not blooming.
- Spray late in the day or early in the morning when the temperature is below ideal foraging temperatures to reduce direct exposure to bees. Honeybees are most active when the temperature is above 18°C (72°F), usually in the heat of the day. As a general rule, evening applications are less hazardous than morning applications.
- Where there is a risk to bees, use an insecticide which has short residual activity to reduce impact on the bees and reduce possibilities of residues occurring in honey and pollen.
- Learn about pollination requirements of the different crops grown and about honeybees and leafcutter bees.

Caution:

Unusually low temperatures during and immediately following applications cause insecticides to remain toxic to bees for a much longer period than normal. High temperatures will extend the foraging period and application time must be adjusted accordingly. Prevent insecticides from drifting into adjacent blooming crops, roadsides and pastures with weeds in bloom, water used by bees, leafcutter shelters, or apiaries by maintaining a reasonable distance from field boundaries, and allowing for the potential movement of insecticides by wind. For more information, contact your provincial agriculturist's office.

Rights and Good Practice

By law, a person, provided that they do not contravene any land use by-laws, regulations, or generally accepted practices, may operate an agricultural operation (including the application of pesticides). It's important that you follow label directions and good practices regarding protection of pollinator species from insecticide applications.

Laws generally alow persons to obtain a benefit on their property provided that the benefit is not achieved at the expense of adjacent landowners. Ensure that pesticides are used in a manner where drift does not occur. Notification ensures that hazards are identified prior to spraying so that farmers or their custom applicators can adjust application practices to prevent problems, and beekeepers can adjust practices to accommodate spraying. Notification is not seeking permission to spray. Producers have the legal right to apply pesticides on their property.

Notification is a two-way street: both the beekeeper and farmer have to make efforts to protect pollinators.

Note: In many cases, beekeepers cannot move or cover their bees, especially during honey flow, so timing and accuracy of an insecticide application plus selection of the safest insecticide where there is risk to bees, are the only ways to safeguard bees.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

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Livestock and residues

The number of days between the application of an insecticide and harvesting, feeding to livestock or grazing is given on the label. These restrictions must be followed to prevent illegal residues in crops and livestock and eliminate hazards to consumers.

The guide

This guide only includes the major insecticides registered for use on field crops in Alberta. Not all insects controlled are listed for each insecticide.

Economic threshold

Before making a decision to apply an insecticide, you need to know if the application would be economically justified. In addition to the expected dollar value of your crop, you need to determine whether the insects present will cause a yield loss greater in value than the cost of control. The economic thresholds listed below will assist you in making this decision. Thresholds are given as the number of insects/unit of measure (such as #/plant or #/m^2) or, for insects that are difficult to sample, the amount of damage evident. Chemical controls are generally only warranted when numbers meet or exceed the threshold level. Remember to sample throughout your field (minimum of 10 samples per 160 acres) to obtain an average infestation level.

Economic thresholds for insect pests of cereals and corn

[illegible]	[illegible]	[illegible]
Aphids		Do not treat for aphids in cereals after the soft dough stage. Aphid populations decrease rapidly as heads mature. **Birdcherry-oat aphid** & **greenbug** vector barley yellow dwarf virus. **Greenbug** injects a toxin which stunts plants.
Greenbug	Seedling: 5 - 15: Boot: 10 - 25 (aphids/stem)	
Birdcherry-oat	Seedling: 20: Boot: 30 (aphids/stem)	
Corn leaf	Seedling: 20: Boot: 30 (aphids/stem)	
English grain	Seedling: 30: Boot: 50 (aphids/stem)	
Russian wheat	**Winter cereals** – Seedling: 15 - 20% after October 1st; **Spring cereals** – Seedling: 10 - 15%; Boot: 15 - 20% (% plants infested)	
Armyworm	11/m^2	
Barley thrips	Mean of 7.5 thrips/stem based on a sample size of 50 stems, chemical control = \$5.75/acre & market value = \$1.90/bushel	Infestations of one thrip/stem have caused losses of 0.4 - 1.25 bushels/acre.
Cutworms		8.4 PWC larvae/m^2 caused 25% loss in wheat; 30 PWC larvae/m^2 caused 100% yield loss **PWC & RBC**: Well established crops with good moisture can tolerate higher numbers.
Pale western	3 - 4/m^2	
Redbacked	5 - 6/m^2	
European corn borer	Dryland grain corn: when 50% of plants show leaf feeding	
Grain stink bug	Wheat: 1/head caused losses greater than 30%	
Grasshoppers	13 /m^2 in fields or 25 /m^2 in roadsides	
Hessian fly	None available	Several larvae per plant may kill barley and wheat.
Orange wheat blossom midge	1 adult seen per every 4 - 5 heads of wheat	Infestations of 30, 60 and 90% reduced spring wheat yields by 40, 65 and 80% respectively in Saskatchewan.
Wheat stem sawfly	None available	Plant resistant varieties if 10 - 15% of the previous crop was cut by sawfly. Infested stems of wheat averaged 17% yield loss.

Livestock and residues

The number of days between the application of an insecticide and harvesting, feeding to livestock or grazing is given on the label. These restrictions must be followed to prevent illegal residues in crops and livestock and eliminate hazards to consumers.

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Economic thresholds for insect pests of cereals and corn

Insect	Economic threshold	Comments
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Birdcherry-oat	Seedling: 20: Boot: 30 (aphids/stem)	
Corn leaf	Seedling: 20: Boot: 30 (aphids/stem)	
English grain	Seedling: 30: Boot: 50 (aphids/stem)	
Russian wheat	**Winter cereals** – Seedling: 15 - 20% after October 1st; **Spring cereals** – Seedling: 10 - 15%; Boot: 15 - 20% (% plants infested)	
Armyworm	11/m^2	
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Redbacked	5 - 6/m^2	
European corn borer	Dryland grain corn: when 50% of plants show leaf feeding	
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Hessian fly	None available	Several larvae per plant may kill barley and wheat.
Orange wheat blossom midge	1 adult seen per every 4 - 5 heads of wheat	Infestations of 30, 60 and 90% reduced spring wheat yields by 40, 65 and 80% respectively in Saskatchewan.
Wheat stem sawfly	None available	Plant resistant varieties if 10 - 15% of the previous crop was cut by sawfly. Infested stems of wheat averaged 17% yield loss.

Economic thresholds for insect pests of oilseed crops

Insect	Economic threshold	Comments
Aphids	Flax: 8 - 10 aphids/stem at green boll stage. Canola: rarely a problem.	Aphids on the top 10 - 15 cm of canola plants near the end of flowering do not cause yield losses.
Army cutworm	Seedling mustard: less than $5/m^2$.	
Bertha armyworm	20 larvae/m^2 consume 65 kg Argentine canola seed/ha	Economic threshold for Polish canola types is likely 25% less than for Argentine.
Diamondback moth	200 - 300 larvae/m^2 in canola. If leaves are on plants, feeding on pods is limited.	Threshold may be lower for Polish than for Argentine type canolas. Timing of the infestation also influences the threshold.
Flea beetles	50% leaf tissue consumed; less if growing and moisture conditions are poor.	Damage is usually most severe along field margins and frequently only field margins require treatment.
Lygus bug	Canola: 1.5 and 2.0 Lygus bug per sweep at the end of bloom and early pod development, respectively (crop stage 4.4 and 5.1) Threshold during pod ripening (crop stage 5.2) appears to be greater than 3 per sweep.	A threshold for the bud stage has not been determined. Experience in 1998 indicates that heavy adult numbers can cause severe bud blast under dry, hot conditions. At least 10 sets of 15 sweeps each taken anywhere in a field are necessary to have an accurate assessment of Lygus numbers. Controls should not be required within 10 days of swathing.
Sunflower beetle	1 adult/2 - 3 seedlings or over 10 larvae/plant.	Severe leaf damage may occur to plants in the 2 - 6 leaf stage when adults are numerous, or at any time when larvae are numerous.
Sunflower maggots	None established.	
Sunflower midge	Losses are more severe around field edges. Estimate losses by sampling heads and classifying them on the degree of head distortion	
Sunflower seed weevils (red & grey)	Oil sunflower: 10 - 12 seed weevil adults/head Confectionery sunflower: One adult/head	Apply treatment at early anthesis when 30 - 70% of sunflower heads are in early pollen formation (R - 5.1 stage). Reinfestation may occur with a high weevil population. Rechecked fields when 80 - 100% of heads are at the R - 5.5 stage.

Economic thresholds for insect pests of forage & special crops

Insect	Economic threshold	Comments
Alfalfa weevil	Alfalfa hay crops: Apply controls when 25 - 50% of leaves on upper one-third of stem show damage or when 50 - 70% of terminals show injury. Alfalfa seed crops: 20 - 25 larvae/90° sweep or when 35 - 50% of foliage tips show damage.	Alfalfa hay crops: 20 - 30 larvae/sweep cause a 12% leaf loss; 50 - 75 larvae/sweep cause a 30% leaf loss. 56 larvae/stem will return treatment costs.
Aphids	Canary grass: 50 per head between heading and soft dough.	
Pea aphid	Field peas: 1 - 4 aphids/20 cm stem tip when 50 - 75% of plants have begun to flower. Alfalfa: 75 - 100 aphids/plant	
Beet leafminer	Sugar beet: Only infestations causing more than 25% defoliation require treatment.	
Grasshoppers	Alfalfa: See Cereals and Corn table. Safflower: 15/m^2.	
Plant bugs	Alfalfa seed; 5 nymphs/sweep (any or all species of plant bugs) when alfalfa is in bud or bloom.	
Sweetclover weevil	Seedling crop (cotyledon stage): 1 weevil/5 seedlings under slow growing conditions or 1 weevil/3 seedlings under normal growing conditions. Newly emerged 2nd-year sweetclover: 9 - 12 weevils/plant.	
Red clover thrips	Red clover seed fields: 50 - 80 thrips/raceme.	Threshold levels have occurred only during years of early spring drought on dryland.

Ambush/Pounce *(permethrin)*

Manufacturer: **Zeneca Agro/United Agri Products**

CAUTION FLAMMABLE

1. **Formulations:** Emulsifiable Concentrates; (Ambush); 500 g/L; 6 x 1 L. (Pounce); 384 g/L; 1 L.
2. **Registered Mixes:** None.
3. **Crops:**

barley
canola
corn
flax
lentils
oats
peas
potatoes
rye
sugar beets
sunflowers
wheat

4. **Insects Controlled:**

Colorado potato beetle
corn earworm
cutworms (army, pale western, red-backed)
European corn borer
fall armyworm
potato flea beetle
potato leafhopper
tarnished plant bug

5. **When Used:** Post-planting treatment.

Air: Apply only once per season.

Cutworms: Applications should be made under warm, moist conditions in the evening or at night when cutworm activity is highest.

Corn borer, corn earworm: Spray no later than when first feeding damage is seen on foliage.

6. **How to Apply:**

With: Aircraft or ground equipment.

Rate: Use higher rate for heavy infestations, when adult insects are present, foliage is dense or for cutworms when soil is dry and/or larvae are large.

Crop	Insect	Formulation	Quantity/ac
Barley, canola, corn, flax, lentils, oats, peas, potato, rye, sugar beets, sunflowers, wheat	Cutworms (army, pale western, red-backed)	Ambush 500 EC	60 - 120 mL
	Cutworms (black, dark-sided, army, pale western, red-backed)	Pounce	73 - 158 mL
Barley, oats, rye, wheat	Pale western cutworm	Pounce	70 - 155 mL
Corn (sweet)	Corn earworm, European corn borer	Ambush 500 EC	80 - 110 mL
		Pounce	110 - 150 mL
	Fall armyworm	Ambush 500 EC	57 mL
		Pounce	73 mL
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug	Ambush 500 EC	60 - 80 mL
		Pounce	75 - 110 mL

Water volume: Corn: Ambush 130 - 180 L/ac; Pounce 140 - 180 L/ac. Potato: sufficient water for thorough coverage of foliage.

Nozzles: Flat fan recommended.

Ambush/Pounce *(permethrin)*

Manufacturer: **Zeneca Agro/United Agri Products**

CAUTION FLAMMABLE

1. **Formulations:** Emulsifiable Concentrates; (Ambush); 500 g/L; 6 x 1 L. (Pounce); 384 g/L; 1 L.
2. **Registered Mixes:** None.
3. **Crops:**

barley
canola
corn
flax
lentils
oats
peas
potatoes
rye
sugar beets
sunflowers
wheat

4. **Insects Controlled:**

Colorado potato beetle
corn earworm
cutworms (army, pale western, red-backed)
European corn borer
fall armyworm
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tarnished plant bug

5. **When Used:** Post-planting treatment.

Air: Apply only once per season.

Cutworms: Applications should be made under warm, moist conditions in the evening or at night when cutworm activity is highest.

Corn borer, corn earworm: Spray no later than when first feeding damage is seen on foliage.

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With: Aircraft or ground equipment.

Rate: Use higher rate for heavy infestations, when adult insects are present, foliage is dense or for cutworms when soil is dry and/or larvae are large.

[illegible]	[illegible]	[illegible]	[illegible]
Barley, canola, corn, flax, lentils, oats, peas, potato, rye, sugar beets, sunflowers, wheat	Cutworms (army, pale western, red-backed)	Ambush 500 EC	60 - 120 mL
	Cutworms (black, dark-sided, army, pale western, red-backed)	Pounce	73 - 158 mL
Barley, oats, rye, wheat	Pale western cutworm	Pounce	70 - 155 mL
Corn (sweet)	Corn earworm, European corn borer	Ambush 500 EC Pounce	80 - 110 mL 110 - 150 mL
	Fall armyworm	Ambush 500 EC Pounce	57 mL 73 mL
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug	Ambush 500 EC Pounce	60 - 80 mL 75 - 110 mL

Water volume: Corn: Ambush 130 - 180 L/ac; Pounce 140 - 180 L/ac. Potato: sufficient water for thorough coverage of foliage.

Nozzles: Flat fan recommended.

Ambush/Pounce (cont'd)

7. **Application Tips:** Corn: Corn earworm, spray to ensure coverage of ears and silk. European corn borer control, consult with provincial personnel for proper timing of spray. Cutworms: Do not disturb soil surface for 5 days after application.
8. **How it Works:** Works by contact and as a stomach poison on a wide range of pests. No systemic or fumigant activity.
9. **Grazing, Cropping and Other Restrictions:** Cover crop or crop treated with permethrin should not be used as a green feed for animals. Pre-harvest interval (days): corn (1), potatoes (1).
10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD$_{50}$ (rats) (mg/kg) = Ambush 500 EC (3,000), Pounce EC (1030). Severe eye irritant. Very toxic to bees and fish. Do not spray when bees are foraging. Spray deposit should be dry before bees begin foraging in treated crops.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes of Equipment* (see page 32) before reuse.

    Caution: Studies have shown that synthetic pyrethroid insecticides can be 1,000 - 10,000 times more toxic to fish than many other insecticides in common use. Careless use of these insecticides can seriously harm sport and commercial fisheries. Entry of these insecticides into small wetlands such as prairie sloughs can affect invertebrate life that is needed for waterfowl reproduction and fish farming. Maintain a **minimum** 30 metre buffer for ground application and a **minimum** 100 metre buffer for aerial application.

    First aid: If in eyes or on skin, use standard first aid measures. **If swallowed**, seek medical attention immediately. Do not induce vomiting as this product contains petroleum distillates.
12. **Storage:** Keep product away from fire, open flame, electric light bulbs and other sources of heat. Minimum storage temperature for Ambush 0°C, Pounce - 12°C.

Counter *(terbufos)*

Manufacturer: **Cyanamid Crop Protection**

DANGER POISON

1. **Formulations:** Granular: Counter 5G; 5%; 20 kg bag, 500 kg mini-bulk bag; Counter 15G; 15%; 25 kg bag; 25 kg lock and load.
2. **Registered Mixes:** 5G may be mixed with fungicide-treated seed.
3. **Crops: 5G:** Canola, mustard. **15G:** Corn (field, sweet), sugar beets.
4. **Insects Controlled: 5G:** Flea beetles. **15G:** Seedcorn maggot, sugar beet root maggot, wireworms.

    Insect Reduction in feeding: 5G: Root maggots.
5. **When Used:**

    Corn, sugar beets: At planting time.

    Canola, mustard: At planting.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

REMARQUE IMPORTANTE CONCERNANT LES PAGES QUI SUIVENT

LES PAGES SUIVANTES ONT ÉTÉ REPRODUITES EN DOUBLE AFIN D'AMÉLIORER LA QUALITÉ DE REPRODUCTION

LES UTILISATEURS DOIVENT CONSULTER TOUTES LES PAGES REPRODUITES SUR LA FICHE AFIN D'OBTENIR LA LECTURE DU TEXTE INTÉGRAL

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6. **How to Apply:**

With: Ground equipment. May be applied with airseeders.

Rate: If extreme infestations of flea beetles are anticipated, use the higher rate.

Crop	Insect	Formulation	kg/ha
Canola, mustard	Flea beetles, root maggots	5G	2.2 - 4.5
Corn	Seedcorn maggot, wireworms	15G	75 g/100 m row (minimum 75 cm row spacing)
Sugar beet	Sugar beet root maggot, wireworms	15G	45 g/100 m row (minimum 50 cm row spacing)

Incorporation:

Canola, mustard: Counter 5G and seed may be mixed at seeding time. Use a mechanical mixer or mix in the drill box. Do not handle with bare hands.

Corn: Place in an 18 cm-wide band over the row directly behind the planter shoe in front of the press wheel, or place directly in the seed furrow behind the planter shoe.

Sugar beets: Apply in furrow, 5 - 8 cm behind the seed drop zone after some soil has covered the seed. Do not place 15G granules in direct contact with seed.

7. **Application Tips:** When a seed treatment is also used – mix the seed treatment with seed, then mix granules with treated seed. Empty hoppers of equipment while still in the field. Cover granules that may be exposed on the ends of the treated rows, turns and field loading or cleaning areas.

8. **How it Works:** Terbufos is a systemic, organophosphorus insecticide with effective initial and residual activity.

Effects of rainfall: The effect of normal rainfall is not appreciable.

Movement in soil: Insoluble in water, therefore, movement is not appreciable.

9. **Grazing, Cropping and Other Restrictions:** Treated sugar beet tops and beet pulp may be fed to livestock after harvest.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (1.6). Highly toxic to fish, birds and other wildlife. Rapidly absorbed through skin. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes of Equipment* (see page 32) before reuse. **Keep out of reach of children and animals.** Rapidly absorbed through skin. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning. Counter 15G – pour downwind, allow as little free fall as possible. Do not pour at face level. Sweep up granules and place in a tightly closed, labelled container. Contact Cyanamid Canada to obtain details on how to detoxify product.

Symptoms of poisoning: Weakness, headache, tightness of chest, blurred vision, non-reactive pinpoint pupils, salivation, sweating, nausea, vomiting, diarrhea or abdominal cramps.

Caution: Seed treated with this product is **extremely** hazardous to livestock. Livestock can be poisoned due to improper storage, improper drill clean-out or improper disposal of treated seed. Never store this insecticide or treated seed in any area accessible to livestock. Clean seed drills away from areas accessible to livestock, and clean up all treated seed spills immediately. Excess treated seed should be disposed of by double planting.

Highly flammable: Fine airborn dust can cause an explosion.

6. **How to Apply:**

With: Ground equipment. May be applied with airseeders.

Rate: If extreme infestations of flea beetles are anticipated, use the higher rate.

Crop	Insect	Formulation	kg/ac
Canola, mustard	Flea beetles, root maggots	5G	2.2 - 4.5
Corn	Seedcorn maggot, wireworms	15G	75 g/100 m row (minimum 75 cm row spacing)
Sugar beet	Sugar beet root maggot, wireworms	15G	45 g/100 m row (minimum 50 cm row spacing)

Incorporation:

Canola, mustard: Counter 5G and seed may be mixed at seeding time. Use a mechanical mixer or mix in the drill box. Do not handle with bare hands.

Corn: Place in an 18 cm-wide band over the row directly behind the planter shoe in front of the press wheel, or place directly in the seed furrow behind the planter shoe.

Sugar beets: Apply in furrow, 5 - 8 cm behind the seed drop zone after some soil has covered the seed. Do not place 15G granules in direct contact with seed.

7. **Application Tips:** When a seed treatment is also used – mix the seed treatment with seed, then mix granules with treated seed. Empty hoppers of equipment while still in the field. Cover granules that may be exposed on the ends of the treated rows, turns and field loading or cleaning areas.

8. **How it Works:** Terbufos is a systemic, organophosphorus insecticide with effective initial and residual activity.

Effects of rainfall: The effect of normal rainfall is not appreciable.

Movement in soil: Insoluble in water, therefore, movement is not appreciable.

9. **Grazing, Cropping and Other Restrictions:** Treated sugar beet tops and beet pulp may be fed to livestock after harvest.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (1.6). Highly toxic to fish, birds and other wildlife. Rapidly absorbed through skin. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes of Equipment* (see page 32) before reuse. **Keep out of reach of children and animals.** Rapidly absorbed through skin. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning. Counter 15G – pour downwind, allow as little free fall as possible. Do not pour at face level. Sweep up granules and place in a tightly closed, labelled container. Contact Cyanamid Canada to obtain details on how to detoxify product.

Symptoms of poisoning: Weakness, headache, tightness of chest, blurred vision, non-reactive pinpoint pupils, salivation, sweating, nausea, vomiting, diarrhea or abdominal cramps.

Caution: Seed treated with this product is **extremely** hazardous to livestock. Livestock can be poisoned due to improper storage, improper drill clean-out or improper disposal of treated seed. Never store this insecticide or treated seed in any area accessible to livestock. Clean seed drills away from areas accessible to livestock, and clean up all treated seed spills immediately. Excess treated seed should be disposed of by double planting.

Highly flammable: Fine airborn dust can cause an explosion.

Counter (cont'd)

First aid: Call a physician at once in all cases of suspected poisoning. In emergency endangering life or property, call collect day or night, 1-613-996-6666. **Antidote is atropine.** Consult your physician about obtaining a supply of 0.65 milligram tablets for emergency use. **If inhaled**, remove to fresh air. If person is not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. **If in eyes or on skin**, use standard first aid measures. Get medical attention for eyes. **If swallowed**, seek medical attention immediately.

Decontamination: All mixing equipment must be rinsed with the decontamination solution.

Decontamination solution: Wash the surface with the decontamination solution prepared by mixing 9 L of water with 1 L of commercial bleach and 0.5 L of rubbing alcohol. Rinse with clean water. If spills occur on floor areas, use a sweeping compound to clean up. Decontaminate the waste with decontamination solution. Wash floor with decontamination solution and rinse well with clean water. Clean up solution and rinse water with absorbent materials such as sawdust, sweeping compound, rags, etc. Dispose of the contaminated absorbent material in accordance with provincial requirements.

12. **Storage:** Store open bags in labelled, sealed drums or heavy plastic bags.

Cygon 4E/Lagon/ Dimethoate 480/ Cygon 480 *(dimethoate)*

[illegible]

Manufacturer **IPCO/United Agri Products/Peacock Industries/Cheminova**

WARNING POISON

1. **Formulations: Emulsifiable concentrate**; 480 g/L. Lagon 480 E 1 L, 4 L, 10 L jugs; Cygon 4E, 4 L, 10 L jug. Dimethoate 480; 10 L container; Cygon 480, 10 L jug. **Bran bait**; 5.2%; Cygon Hopper Stopper; 20 kg box (See Bait directions below).
2. **Registered Mixes:** None.
3. **Crops:**
   alfalfa
   barley
   beans
   canary seed
   canola
   clovers
   corn
   flax
   oats
   pastures
   peas
   potatoes
   rye
   safflowers
   sugar beets
   sunflowers
   wheat
4. **Insects Controlled:**
   aphids
   grasshoppers
   leafhoppers
   lygus bugs
   mites
   plant bugs
   stink bug
   sweet clover weevil
   tarnished plant bugs
   thrips

   Insects suppressed: Alfalfa weevil larvae, Russian wheat aphid.
5. **When Used:** Apply when economic damage is apparent. Repeat if necessary.

6. **How to Apply:**

With: Aircraft or ground equipment.

Rate: Use lower rate for young insects, minor infestations or sparse foliage; higher rate for adult insects (winged grasshoppers and beetles), severe infestations or dense foliage.

Crop	Insect	mL/ac	Crop	Insect	mL/ac
Alfalfa	Aphids, young grasshoppers.	170	Beans	Aphids, leafhoppers, leafminers, lygus bugs, grasshoppers, mites, tarnished plant bugs	225 - 400
	Leafhoppers, lygus bugs, plant bugs, alfalfa weevil larvae suppression, pea aphid	500			
	Adult or winged grasshoppers	405	Canary Seed	Aphids	200
	Sweet clover weevil	344 - 400	Canola	Aphids, grasshoppers, leafhoppers	340 - 360
Barley, oats, rye, wheat	Grasshoppers, aphids, stink bug	175 - 400	Clover (sweet)	Sweet clover weevil	340 - 400
			Flax	Potato aphid	177
			Peas	Aphids	110 - 170
Barley, oats, rye, wheat	Thrips	400	Potato	Aphids, leafhoppers, tarnished plant bug	225 - 450
Barley, oats, wheat	Russian wheat aphid suppression	400	Safflowers	Grasshoppers	400
Wheat	Orange wheat blossom midge	405			

Note: Check product label to ensure the registration for a pest insect is covered by the company.

Water volume: 18 L/ac for good coverage. Potatoes: 80 L/ac minimum; Safflowers: 9 L/ac.

Nozzles: Flat fan recommended.

7. **Application Tips:** Not suitable for application in oil. Do not use when bees are foraging. When using foliar sprays, do not apply during heat of the day or when temperatures are excessively high.

8. **How it Works:** Dimethoate is a broad-spectrum – systemic and contact – organophosphate insecticide and acaricide.

9. **Grazing, Cropping and Other Restrictions:** Remove cattle prior to spraying. Pre-harvest and pre-grazing intervals depend on rate used. Do not harvest or graze within (days): 170 - 220 mL/ac – (2); 340 - 360 mL/ac – canola (7), grains (21); 360 - 450 mL/ac – (28). Do not harvest potatoes within 7 days. Russian wheat aphid: do not graze within 7 days, and do not harvest within 21 days.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (500 - 680), technical (180 - 336). Highly toxic to birds, bees and other animals. Can be absorbed through the skin. Do not use when bees are foraging.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes of Equipment* (see page 32) before reuse.

Symptoms of poisoning: Anorexia, nausea, vomiting, pinpoint pupils, excessive salivation, muscle twitching, convulsions or coma.

First aid: If in eyes or on skin, use standard first aid measures. **If swallowed**, seek medical attention.

Notes to physician: Dimethoate is a cholinesterase inhibitor and an organophosphate insecticide. Atropinize slowly to avoid cardiac arrest. Avoid aspiration and respiratory depressants.

Decontamination:

Spills: Scrub contaminated area immediately with a strong laundry soap solution or use household lye – detergents are not satisfactory. Repeated scrubbings are necessary on plain wood surfaces.

12. **Storage:** Store between 5°C and 30°C, away from feed and food.

6. **How to Apply:**

With: Aircraft or ground equipment.

Rate: Use lower rate for young insects, minor infestations or sparse foliage; higher rate for adult insects (winged grasshoppers and beetles), severe infestations or dense foliage.

Crop	Insect	mL/ac	Crop	Insect	mL/ac
Alfalfa	Aphids, young grasshoppers.	170	Beans	Aphids, leafhoppers, leafminers, lygus bugs, grasshoppers, mites, tarnished plant bugs	225 - 400
	Leafhoppers, lygus bugs, plant bugs, alfalfa weevil larvae suppression, pea aphid	500			
	Adult or winged grasshoppers	405	Canary Seed	Aphids	200
	Sweet clover weevil	344 - 400	Canola	Aphids, grasshoppers, leafhoppers	340 - 360
Barley, oats, rye, wheat	Grasshoppers, aphids, stink bug	175 - 400	Clover (sweet)	Sweet clover weevil	340 - 400
			Flax	Potato aphid	177
			Peas	Aphids	110 - 170
Barley, oats, rye, wheat	Thrips	400	Potato	Aphids, leafhoppers, tarnished plant bug	225 - 450
Barley, oats, wheat	Russian wheat aphid suppression	400	Safflowers	Grasshoppers	400
Wheat	Orange wheat blossom midge	405			

Note: Check product label to ensure the registration for a pest insect is covered by the company.

Water volume: 18 L/ac for good coverage. Potatoes: 80 L/ac minimum; Safflowers: 9 L/ac.

Nozzles: Flat fan recommended.

7. **Application Tips:** Not suitable for application in oil. Do not use when bees are foraging. When using foliar sprays, do not apply during heat of the day or when temperatures are excessively high.

8. **How it Works:** Dimethoate is a broad-spectrum – systemic and contact – organophosphate insecticide and acaricide.

9. **Grazing, Cropping and Other Restrictions:** Remove cattle prior to spraying. Pre-harvest and pre-grazing intervals depend on rate used. Do not harvest or graze within (days): 170 - 220 mL/ac – (2); 340 - 360 mL/ac – canola (7), grains (21); 360 - 450 mL/ac – (28). Do not harvest potatoes within 7 days. Russian wheat aphid: do not graze within 7 days, and do not harvest within 21 days.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (500 - 680), technical (180 - 336). Highly toxic to birds, bees and other animals. Can be absorbed through the skin. Do not use when bees are foraging.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes of Equipment* (see page 32) before reuse.

Symptoms of poisoning: Anorexia, nausea, vomiting, pinpoint pupils, excessive salivation, muscle twitching, convulsions or coma.

First aid: If in eyes or on skin, use standard first aid measures. **If swallowed**, seek medical attention.

Notes to physician: Dimethoate is a cholinesterase inhibitor and an organophosphate insecticide. Atropinize slowly to avoid cardiac arrest. Avoid aspiration and respiratory depressants.

Decontamination:

Spills: Scrub contaminated area immediately with a strong laundry soap solution or use household lye – detergents are not satisfactory. Repeated scrubbings are necessary on plain wood surfaces.

12. **Storage:** Store between 5°C and 30°C, away from feed and food.

Cygon 4E/Lagon/Dimethoate 480/Cygon 480 (cont'd)

Hopper stopper bran bait

Application: Applied dry, broadcast evenly. Use no more than once a week for heavy infestations; no more than once every 2 weeks for moderate to low infestations. Do not contaminate bodies of water, food or feed. Non-toxic to pollinators if applied as directed.

Crops: Cereals, forages, pastures, roadsides, waste areas.

Insect: Grasshoppers.

Rate: 0.8 - 1.2 kg/ac.

Restrictions: Beef cattle: Do not have to be removed during treatment. Dairy cattle: Do not graze or harvest forage for 48 hours. Grain crops: Do not harvest for 21 days after treatment.

Cymbush/Ripcord *(cypermethrin)*

Manufacturer: **Zeneca Agro/Cyanamid Crop Protection**

WARNING POISON

1. **Formulations:** Emulsifiable Concentrate; Cymbush; 250 g/L; 1 L jugs; Ripcord 400 EC; 400 g/L; 6 x 1 L pack.
2. **Registered Mixes:** None.
3. **Crops:**

   Cymbush: Canola, corn, mustard, potatoes, sunflowers.

   Ripcord: Barley, corn, canola, headlands, potatoes, rapeseed, roadsides, summerfallow, sunflower, wheat.
4. **Insects Controlled:**

   Bertha armyworm
   Colorado potato beetle
   corn earworm
   crucifer flea beetle
   cutworms
   European corn borer
   flea beetles
   grasshoppers
   potato flea beetle
   potato leafhopper
   strawberry weevil
   sunflower beetle
   tarnished plant bug
   tuber flea beetle
5. **When Used:**

   Ground: Do not apply more than 3 times per season.

   Air: Canola, sunflowers: once per season. Corn, potatoes: up to 2 times per season.
   Apply when insects appear or early signs of insect feeding.

6. How to Apply:

With: Aircraft or ground equipment.

Cutworms: Ground only.

Rate:

Crop	Insect	Cymbush (mL/ac)	Ripcord (mL/ac)
Barley, canola, headlands, roadsides, summerfallow, wheat	Grasshoppers	–	20 - 28
Corn	European corn borer	113	70
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tuber flea beetle	55	25 - 50
	Tarnished plant bug	80	50
	Variegated (climbing) cutworm	–	70
Canola, mustard (*canola only)	Crucifer flea beetle	55	–
	Flea beetles*	–	20
	Bertha armyworm	80 - 113	28 (ground)* 35 (air)*
Seedling potatoes, corn, barley and wheat	Cutworms (army, dark-sided, pale western, redbacked)	–	70
Strawberry	Strawberry weevil	–	70
	Tarnished plant bug	–	100
Sunflowers	Sunflower beetle	40	28

Water volume:
Ground: Corn: 130 - 180 L/ac; potatoes and strawberries: 121 - 202 L/ac; other crops 40 - 50 L/ac.
Cutworms (ground only): 80 - 200 L/ac.
Air: Canola (Bertha armyworm), corn (European corn borer), potatoes (Colorado potato beetle, flea beetles, leafhoppers and tarnished plant bug), sunflowers (sunflower beetle): 4.5 - 9.0 L/ac.

Pressure: 250 - 300 kPa.

Nozzles: Flat fan recommended.

7. Application Tips:

Corn: Direct spray to ensure coverage of ears and silk. Consult your local provincial personnel for proper timing of spray.

Grasshoppers: Avoid application when temperatures are above 25°C. Bees: spray mist must be dried before bees begin foraging in treated crop.

Cutworms: Spray under warm, moist conditions and do not disturb the soil surface for at least 5 days.

8. How it Works: By contact and stomach action. Good residual activity. No systemic or fumigant activity.

9. Grazing, Cropping and Other Restrictions: Pre-harvest interval (days); barley (60); wheat (30); canola (30), corn (5), mustard (30), potatoes (7), sunflowers (70). Treated crops must not be used as a green feed for animals. 15 m buffer zone from water must be maintained when applying by ground. 100 m buffer zone from water must be maintained when spraying by air.

10. Toxicity: Low-moderate mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = cypermethrin (3,200), Cymbush (760); Ripcord (542). Very toxic to bees and fish.

6. How to Apply:

With: Aircraft or ground equipment.

Cutworms: Ground only.

Rate:

Crop	Insect	Cymbush (mL/ac)	Ripcord (mL/ac)
Barley, canola, headlands, roadsides, summerfallow, wheat	Grasshoppers	–	20 - 28
Corn	European corn borer	113	70
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tuber flea beetle	55	25 - 50
	Tarnished plant bug	80	50
	Variegated (climbing) cutworm	–	70
Canola, mustard (*canola only)	Crucifer flea beetle	55	–
	Flea beetles*	–	20
	Bertha armyworm	80 - 113	28 (ground)* 35 (air)*
Seedling potatoes, corn, barley and wheat	Cutworms (army, dark-sided, pale western, redbacked)	–	70
Strawberry	Strawberry weevil	–	70
	Tarnished plant bug	–	100
Sunflowers	Sunflower beetle	40	28

Water volume:

Ground: Corn: 130 - 180 L/ac; potatoes and strawberries: 121 - 202 L/ac; other crops 40 - 50 L/ac.
Cutworms (ground only): 80 - 200 L/ac.
Air: Canola (Bertha armyworm), corn (European corn borer), potatoes (Colorado potato beetle, flea beetles, leafhoppers and tarnished plant bug), sunflowers (sunflower beetle): 4.5 - 9.0 L/ac.

Pressure: 250 - 300 kPa.

Nozzles: Flat fan recommended.

7. Application Tips:

Corn: Direct spray to ensure coverage of ears and silk. Consult your local provincial personnel for proper timing of spray.

Grasshoppers: Avoid application when temperatures are above 25 C. Bees: spray mist must be dried before bees begin foraging in treated crop.

Cutworms: Spray under warm, moist conditions and do not disturb the soil surface for at least 5 days.

8. How it Works: By contact and stomach action. Good residual activity. No systemic or fumigant activity.

9. Grazing, Cropping and Other Restrictions: Pre-harvest interval (days): barley (60); wheat (30); canola (30), corn (5), mustard (30), potatoes (7), sunflowers (70). Treated crops must not be used as a green feed for animals. 15 m buffer zone from water must be maintained when applying by ground. 100 m buffer zone from water must be maintained when spraying by air.

10. Toxicity: Low-moderate mammalian toxicity. Acute oral LD$_{50}$ (rats) (mg/kg) = cypermethrin (3,200), Cymbush (760); Ripcord (542). Very toxic to bees and fish.

Cymbush/Ripcord (cont'd)

11. **Precautions, First Aid:** Harmful or fatal if swallowed or absorbed through skin. Avoid contact with eyes and clothing. Spray mist must be dried before bees begin foraging in treated crop. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes of Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures.

    Caution: Studies have shown that synthetic pyrethroid insecticides can be 1,000 - 10,000 times more toxic to fish than many other insecticides in common use. Careless use of these insecticides can seriously harm sport and commercial fisheries. Entry of these insecticides into small wetlands such as prairie sloughs can affect invertebrate life which is needed for waterfowl reproduction and fish farming. Maintain a **minimum** 15 metre buffer for ground application and a **minimum** 100 metre buffer for aerial application. Applications should not be made when wind or rain could favour drift or run-off into lakes and ponds. May explode if heated.

    First aid: If swallowed, seek medical attention immediately. Do not induce vomiting as this product contains petroleum distillates.

    Notes to physician: It is a CNS depressant. Steroids can be used to reduce inflammation. Avoid aspiration.

12. **Storage:** Store in a heated chemical shed.

Decis *(deltamethrin)*

Manufacturer: **Aventis Crop Science**

DANGER POISON

1. **Formulations:** Emulsifiable Concentrate: Decis 5 EC: 50 g/L: 2.0 L jugs. Flowable: Decis 5 F: 50 g/L: 3 L jugs.

2. **Registered Mixes:** Hoe-Grass II, Hoe-Grass 284, Pardner, Buctril M, Banvel, Stampede, 2,4-D, MCPA.

    Mixing restrictions: Do not mix with any other chemicals, additives or fertilizers.

3. **Crops:**

    Decis 5 EC: Alfalfa (for seed production only), barley, canola, field corn, flax, lentils, mustard, oats, pastures (or rangeland), potatoes, sugar beets, sunflowers, wheat (all types).

    Decis 5 F: Barley, canola, flax, lentils, mustard, oats, wheat (all types), pastures (or rangeland).

4. **Insects Controlled:**

    Decis 5 F: Only flea beetles and grasshoppers.

    Decis 5 EC

    alfalfa weevil
    Bertha armyworm
    clover cutworm
    Colorado potato beetle
    cutworms
    diamondback moth
    European corn borer
    flea beetles
    grasshoppers
    leafhoppers
    lygus bugs
    potato flea beetle
    sunflower beetle
    tarnished plant bug

5. **When Used:** When economic damage is apparent. Grasshoppers: Best results on young (non-flying) grasshoppers (2 - 4 nymphal stage). Sunflower beetle: When crop is in cotyledon to 2 leaf stage. European corn borer: Apply when egg masses begin to hatch. Consult your crop specialists for appropriate spray schedule.

    Number of applications: Maximum of 1 per year on Bertha armyworm, cutworms, diamondback moth, potato flea beetle, sunflower beetle. Other pests, maximum of 3 per year. Only 1 aerial application per year except for grasshoppers and potato pests, which can be sprayed twice per year by air.

6. How to Apply:

With: Aircraft: Decis 5 EC and 5 F: Barley, canola, flax, lentils, mustard, oats, pastures, rangeland, wheat. Decis 5 EC only: potatoes, sunflowers. Ground equipment: All crops.

Rate: Use a higher rate for severe infestations, when foliage is dense or when grasshoppers are in the late nymphal or adult stage.

Crop	Insect	Decis 5 F (mL/ac)
Barley, flax, lentils, oats, pastures, rangeland, wheat	Grasshoppers	32 - 50
Canola, mustard	Flea beetles	40 - 60

Crop	Insect	Decis 5 EC (mL/ac)
Alfalfa (seed production only)	Alfalfa weevil, lygus bugs	80 - 100
Barley, flax, lentils, oats, pasture (or rangeland), sugar beets, wheat	Cutworms	80
	Grasshoppers	40 - 60
Canola, mustard	Bertha armyworm, clover cutworm, diamondback moth, flea beetles	40 - 60
Field corn	European corn borer	100 - 120
Flax	Clover cutworm, beet webworm	40 - 60
Potato	Colorado potato beetle, leafhoppers, potato flea beetle, tarnished plant bug	40 - 60
Sunflowers	Sunflower beetle	40

Note: Decis 5 EC on high organic (muck) soils: apply 80 mL/ac. Apply only once during each crop year, prior to August 1.

Water volume: Air: Decis 5 EC and 5 F: 4.4 - 8.8 L/ac. Ground: Decis 5 EC: Alfalfa 40 - 120 L/ac; Field corn 100 L/ac minimum. Potatoes 80 - 200 L/ac. Decis 5 EC and 5 F: Canola, mustard 40 L/ac; Cereals 40 - 80 L/ac.

Pressure: Air: 200 kPa minimum. Ground: 275 kPa.

Nozzles: Aerial droplet size 150 - 250 micron recommended. Flat fan only.

Decis 5 F: 50 mesh or larger line strainers and screens.

7. Application Tips:

Air application: Leave 100 m border between edge of treated fields and environmentally sensitive areas (e.g., wetlands, sloughs, rivers, houses, farm buildings). Best control is achieved by morning or evening applications. Do not spray under a strong temperature inversion or when temperature exceeds 25 C. With severe flea beetle and grasshopper infestations, spray fence rows and a 15 m strip into adjacent summerfallow and cropped fields. For grasshoppers use high EC rate only.

8. How it Works: Deltamethrin is a non-systemic, synthetic pyrethroid that works by contact and ingestion.

Expected results: Speed of kill depends on target insect and environmental conditions, and death can occur within 2 hours.

Effects of rainfall: Do not apply within 1 hour of rain.

Movement in soil: Becomes fixed on soil colloidal particles and broken down by micro-organisms.

9. Grazing, Cropping and Other Restrictions: Pre-harvest interval (days): canola (14), mustard (14); barley and wheat (40), oats (31), lentils (30), flax (40); potatoes (3); sunflowers (70). Do not allow rangeland beef cattle to graze treated fields within one day of application.

Warning: Dairy cattle must not be fed treated silage or grazed on Decis treated crops. Foraging is only permitted for rangeland beef cattle. Do not feed harvested alfalfa forage within 90 days of harvest.

Cymbush/Ripcord (cont'd)

11. **Precautions, First Aid:** Harmful or fatal if swallowed or absorbed through skin. Avoid contact with eyes and clothing. Spray mist must be dried before bees begin foraging in treated crop. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes of Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures.

    Caution: Studies have shown that synthetic pyrethroid insecticides can be 1,000 - 10,000 times more toxic to fish than many other insecticides in common use. Careless use of these insecticides can seriously harm sport and commercial fisheries. Entry of these insecticides into small wetlands such as prairie sloughs can affect invertebrate life which is needed for waterfowl reproduction and fish farming. Maintain a **minimum** 15 metre buffer for ground application and a **minimum** 100 metre buffer for aerial application. Applications should not be made when wind or rain could favour drift or run-off into lakes and ponds. May explode if heated.

    First aid: If swallowed, seek medical attention immediately. Do not induce vomiting as this product contains petroleum distillates.

    Notes to physician: It is a CNS depressant. Steroids can be used to reduce inflammation. Avoid aspiration.

12. **Storage:** Store in a heated chemical shed.

Decis *(deltamethrin)*

[illegible]

Manufacturer **Aventis Crop Science**

DANGER POISON

1. **Formulations:** Emulsifiable Concentrate; Decis 5 EC; 50 g/L; 2.0 L jugs. Flowable; Decis 5 F; 50 g/L; 3 L jugs.

2. **Registered Mixes:** Hoe-Grass II, Hoe-Grass 284. Pardner, Buctril M, Banvel, Stampede, 2,4-D, MCPA.

    Mixing restrictions: Do not mix with any other chemicals, additives or fertilizers.

3. **Crops:**

    Decis 5 EC: Alfalfa (for seed production only), barley, canola, field corn, flax, lentils, mustard, oats, pastures (or rangeland), potatoes, sugar beets, sunflowers, wheat (all types).

    Decis 5 F: Barley, canola, flax, lentils, mustard, oats, wheat (all types), pastures (or rangeland).

4. **Insects Controlled:**

    [illegible]

    [illegible]

    - alfalfa weevil
    - Bertha armyworm
    - clover cutworm
    - Colorado potato beetle
    - cutworms
    - diamondback moth
    - European corn borer
    - flea beetles
    - grasshoppers
    - leafhoppers
    - lygus bugs
    - potato flea beetle
    - sunflower beetle
    - tarnished plant bug

5. **When Used:** When economic damage is apparent. Grasshoppers: Best results on young (non-flying) grasshoppers (2 - 4 nymphal stage). Sunflower beetle: When crop is in cotyledon to 2 leaf stage. European corn borer: Apply when egg masses begin to hatch. Consult your crop specialists for appropriate spray schedule.

    Number of applications: Maximum of 1 per year on Bertha armyworm, cutworms, diamondback moth, potato flea beetle, sunflower beetle. Other pests, maximum of 3 per year. Only 1 aerial application per year except for grasshoppers and potato pests, which can be sprayed twice per year by air.

6. **How to Apply:**

With: Aircraft: Decis 5 EC and 5 F: Barley, canola, flax, lentils, mustard, oats, pastures, rangeland, wheat. Decis 5 EC only: potatoes, sunflowers. Ground equipment: All crops.

Rate: Use a higher rate for severe infestations, when foliage is dense or when grasshoppers are in the late nymphal or adult stage.

[illegible]	[illegible]	[illegible]
Barley, flax, lentils, oats, pastures, rangeland, wheat	Grasshoppers	32 - 50
Canola, mustard	Flea beetles	40 - 60

[illegible]	[illegible]	[illegible]
Alfalfa (seed production only)	Alfalfa weevil, lygus bugs	80 - 100
Barley, flax, lentils, oats, pasture (or rangeland), sugar beets, wheat	Cutworms	80
	Grasshoppers	40 - 60
Canola, mustard	Bertha armyworm, clover cutworm, diamondback moth, flea beetles	40 - 60
Field corn	European corn borer	100 - 120
Flax	Clover cutworm, beet webworm	40 - 60
Potato	Colorado potato beetle, leafhoppers, potato flea beetle, tarnished plant bug	40 - 60
Sunflowers	Sunflower beetle	40

Note: Decis 5 EC on high organic (muck) soils: apply 80 mL/ac. Apply only once during each crop year, prior to August 1.

Water volume: Air: Decis 5 EC and 5 F: 4.4 - 8.8 L/ac. Ground: Decis 5 EC: Alfalfa 40 - 120 L/ac; Field corn 100 L/ac minimum. Potatoes 80 - 200 L/ac. Decis 5 EC and 5 F: Canola, mustard 40 L/ac; Cereals 40 - 80 L/ac.

Pressure: Air: 200 kPa minimum. Ground: 275 kPa.

Nozzles: Aerial droplet size 150 - 250 micron recommended. Flat fan only.

Decis 5 F: 50 mesh or larger line strainers and screens.

7. **Application Tips:**

Air application: Leave 100 m border between edge of treated fields and environmentally sensitive areas (e.g., wetlands, sloughs, rivers, houses, farm buildings). Best control is achieved by morning or evening applications. Do not spray under a strong temperature inversion or when temperature exceeds 25°C. With severe flea beetle and grasshopper infestations, spray fence rows and a 15 m strip into adjacent summerfallow and cropped fields. For grasshoppers use high EC rate only.

8. **How it Works:** Deltamethrin is a non-systemic, synthetic pyrethroid that works by contact and ingestion.

Expected results: Speed of kill depends on target insect and environmental conditions, and death can occur within 2 hours.

Effects of rainfall: Do not apply within 1 hour of rain.

Movement in soil: Becomes fixed on soil colloidal particles and broken down by micro-organisms.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): canola (14), mustard (14); barley and wheat (40), oats (31), lentils (30), flax (40); potatoes (3); sunflowers (70). Do not allow rangeland beef cattle to graze treated fields within one day of application.

Warning: Dairy cattle must not be fed treated silage or grazed on Decis treated crops. Foraging is only permitted for rangeland beef cattle. Do not feed harvested alfalfa forage within 90 days of harvest.

Decis (cont'd)

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = Decis (395). Severe eye and skin irritant. Very toxic to aquatic organisms and fish. Toxic to bees and other beneficial insects. Do not apply when bees are foraging.

    Caution: Studies have shown that synthetic pyrethroid insecticides can be 1,000 - 10,000 times more toxic to fish than many other insecticides in common use. Careless use of these insecticides can seriously harm sport and commercial fisheries. Entry of these insecticides into small wetlands such as prairie sloughs can affect invertebrate life that is needed for waterfowl reproduction and fish farming. Maintain a **minimum** 30 metre buffer for ground application and a **minimum** 100 metre buffer for aerial application. Applications should not be made when wind or rain could favour drift or run-off into lakes, ponds.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes of Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Neurological dysfunction, such as convulsion, with severe poisoning.

    First aid: If in eyes or on skin, use standard first aid measures. **If swallowed**, seek medical attention.

12. **Storage:** Do not store below freezing. Do not store near feed or food. Keep away from heat, sparks and open flames.

Dyfonate II 10G *(fonofos)*

[illegible]

Manufacturer **Zeneca Agro**

DANGER POISON

1. **Formulations:** Granular, 10%, 20 kg bag.
2. **Registered Mixes:** None.
3. **Crops:** Corn (field and sweet), potatoes.
4. **Insects Controlled:** Seedcorn maggot, wireworms, tuber flea beetle.
5. **When Used:** Apply prior to or at planting time.
6. **How to Apply:**

   With: Ground equipment.

   Corn: Place in a 15 - 20 cm band over the row. Incorporate with the top 1 - 3 cm of soil by making application ahead of press wheels, or by use of special covering devices or by dragging a short length of chain behind the press wheels. (Do not place Dyfonate II 10G in direct contact with the seed). Dyfonate II 10G may also be broadcast prior to seeding and incorporated 5 - 7 cm into the soil.

   Potatoes: Place into the fertilizer furrows by regulated flow. Dyfonate II may also be broadcast and incorporated into the soil by discing or rototilling to a depth of 15 cm prior to planting.

Rate: If severe infestations are expected, use the higher rate.

Crop:

Corn

a) Banded:

Row width (cm)	75	90	96 - 102
[illegible]		Rate (kg/ac)	
Seedcorn maggot	4.5 - 5.8	3.8 - 4.9	3.2 - 4.5
Wireworms	5.8	4.9	4.5

b) Broadcast: for control of wireworms apply 17.8 kg/ac.

Potatoes:

Banded: for control of wireworms apply 9 kg/ac. Broadcast: for control of wireworms and first-generation tuber flea beetle, apply 22.7 kg/ac. Use only on irrigated soil.

7. **Application Tips:** See "*How To Apply*."

8. **How it Works:** Fonofos is a organophosphorus insecticide with effective initial and residual activity.

   Effects of rainfall: The effect of normal rainfall is not appreciable.

   Movement in soil: Insoluble in water, therefore, movement is not appreciable.

9. **Grazing, Cropping and Other Restrictions:** None.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) = 103 - 230 mg/kg. This product is toxic to fish, birds and other wildlife.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If swallowed,** immediately dilute the swallowed material by giving large quantities of water and then induce vomiting. Give liquids until vomit is clear. Never give anything by mouth to an unconscious or convulsing person. Call a physician or the nearest poison control centre immediately. **If inhaled,** remove the victim to fresh air. If breathing has ceased, clear the victim's airway and start artificial respiration, preferably by medical means. Call a physician immediately. **If in eyes**, immediately flush eyes with large amounts of running water for at least 15 minutes. Get medical attention immediately. Continue flushing eyes for an additional 15 minutes if a physician is not available. **If on skin**, remove contaminated clothing and immediately wash skin thoroughly for 15 minutes with soap and water. Avoid abrading the skin. Get medical attention immediately.

    Symptoms of poisoning: Include weakness, tightness of chest, blurred vision, nonreactive pinpoint pupils, salivation, sweating, nausea, vomiting, diarrhea and abdominal cramps.

    First aid: Call a physician immediately if a known exposure occurs. Do not wait for symptoms to develop. Immediately initiate the recommended procedures above. **Important** – be sure to advise the physician that this compound is a cholinesterase inhibitor and follow the physician's advice. **Atropine by injection is antidotal.** 2-PAM may be effective as an adjunct to atropine.

12. **Storage:** Do not transport or store with any food or feed intended for human or animal consumption. Not for use or storage in or around the home. Store in a cool, dry place. Protect from excessive heat. Keep this product in the original container.

Rate: If severe infestations are expected, use the higher rate.

Crop:

Corn

a) Banded:

Row width (cm)	75	90	96 - 102
Insect		**Rate (kg/ac)**	
Seedcorn maggot	4.5 - 5.8	3.8 - 4.9	3.2 - 4.5
Wireworms	5.8	4.9	4.5

b) Broadcast: for control of wireworms apply 17.8 kg/ac.

Potatoes:

Banded: for control of wireworms apply 9 kg/ac. Broadcast: for control of wireworms and first-generation tuber flea beetle, apply 22.7 kg/ac. Use only on irrigated soil.

7. **Application Tips:** See *"How To Apply."*

8. **How it Works:** Fonofos is a organophosphorus insecticide with effective initial and residual activity.

   Effects of rainfall: The effect of normal rainfall is not appreciable.

   Movement in soil: Insoluble in water, therefore, movement is not appreciable.

9. **Grazing, Cropping and Other Restrictions:** None.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) = 103 - 230 mg/kg. This product is toxic to fish, birds and other wildlife.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If swallowed,** immediately dilute the swallowed material by giving large quantities of water and then induce vomiting. Give liquids until vomit is clear. Never give anything by mouth to an unconscious or convulsing person. Call a physician or the nearest poison control centre immediately. **If inhaled,** remove the victim to fresh air. If breathing has ceased, clear the victim's airway and start artificial respiration, preferably by medical means. Call a physician immediately. **If in eyes**, immediately flush eyes with large amounts of running water for at least 15 minutes. Get medical attention immediately. Continue flushing eyes for an additional 15 minutes if a physician is not available. **If on skin**, remove contaminated clothing and immediately wash skin thoroughly for 15 minutes with soap and water. Avoid abrading the skin. Get medical attention immediately.

    Symptoms of poisoning: Include weakness, tightness of chest, blurred vision, nonreactive pinpoint pupils, salivation, sweating, nausea, vomiting, diarrhea and abdominal cramps.

    First aid: Call a physician immediately if a known exposure occurs. Do not wait for symptoms to develop. Immediately initiate the recommended procedures above. **Important** – be sure to advise the physician that this compound is a cholinesterase inhibitor and follow the physician's advice. **Atropine by injection is antidotal.** 2-PAM may be effective as an adjunct to atropine.

12. **Storage:** Do not transport or store with any food or feed intended for human or animal consumption. Not for use or storage in or around the home. Store in a cool, dry place. Protect from excessive heat. Keep this product in the original container.

Dylox *(trichlorfon)*

Manufacturer: **Bayer Inc.**

DANGER POISON

1. **Formulations:** Solution; 420 g/L; 20 L container.
2. **Registered Mixes:**

   Mixing instructions: Use immediately after mixing as the product breaks down rapidly in water, especially at pH above 7.
3. **Crops:** Alfalfa, barley, beans (dry, lima, snap), canola, corn (field, popcorn, sweet), flax, oats, sugar beets, wheat.
4. **Insects Controlled:**

   alfalfa caterpillar
   armyworms (beet, Bertha, common, true, western yellow-striped)
   cutworms, variegated
   diamondback moth
   dipterous leaf miner
   imported cabbageworm
   lygus bugs
   stink bugs
   tarnished plant bug
   webworm (alfalfa, beet)
5. **When Used:**

   Alfalfa: 1 application per cutting.

   Barley, flax, oats, wheat: Repeat as necessary prior to flowering or head emergence. Do not apply to flax after flowering. One additional application may be made to barley, oats and wheat after heads emerge from sheath.

   Beans: Repeat as necessary. Do not apply to lima beans after pod set.

   Canola, sugar beets: Repeat as necessary.

   Corn (field, sweet): Maximum of 3 per season with either formulation. Early applications when plants are 8 - 30 cm tall.
6. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate: Low rate for immature insects, light infestations or sparse foliage.

   Exception: Webworm control on sugar beets – use higher rate with low volume air application, low rate with row crop sprayers.

Crop	Insect	Liquid L/ac
Alfalfa	Alfalfa caterpillar	0.4 - 0.6
	Alfalfa webworm	0.28 - 1.1
	Beet armyworm	0.6 - 1.1
	Lygus bugs, stink bugs, tarnished plant bug	1.1
Barley, flax, oats, wheat	Armyworms (common, true, western yellow-striped)	0.6
	Beet webworm	0.6 - 1.1
	Bertha armyworm	1.1
Beans	Armyworms, imported cabbageworm, dipterous leaf miner, lygus bugs, stink bug	1.1 - 1.6
Canola	Beet webworm	0.6
	Diamondback moth	1.1
	Lygus bugs	0.55
Corn (field, sweet)	Armyworms, cutworms	0.6 - 1.1
Sugar beet	Beet webworm	0.3 - 0.6
	Dipterous leaf miners	0.6 - 1.1
	Alfalfa webworm, beet armyworm	1.1 - 1.6

Dylox *(trichlorfon)*

Manufacturer: **Bayer Inc**

DANGER POISON

1. **Formulations:** Solution; 420 g/L; 20 L container.
2. **Registered Mixes:**

   Mixing instructions: Use immediately after mixing as the product breaks down rapidly in water, especially at pH above 7.
3. **Crops:** Alfalfa, barley, beans (dry, lima, snap), canola, corn (field, popcorn, sweet), flax, oats, sugar beets, wheat.
4. **Insects Controlled:**

alfalfa caterpillar
armyworms (beet, Bertha, common, true, western yellow-striped)
cutworms, variegated
diamondback moth
dipterous leaf miner
imported cabbageworm
lygus bugs
stink bugs
tarnished plant bug
webworm (alfalfa, beet)

5. **When Used:**

   Alfalfa: 1 application per cutting.

   Barley, flax, oats, wheat: Repeat as necessary prior to flowering or head emergence. Do not apply to flax after flowering. One additional application may be made to barley, oats and wheat after heads emerge from sheath.

   Beans: Repeat as necessary. Do not apply to lima beans after pod set.

   Canola, sugar beets: Repeat as necessary.

   Corn (field, sweet): Maximum of 3 per season with either formulation. Early applications when plants are 8 - 30 cm tall.
6. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate: Low rate for immature insects, light infestations or sparse foliage.

   Exception: Webworm control on sugar beets – use higher rate with low volume air application, low rate with row crop sprayers.

[illegible]	[illegible]	[illegible]
Alfalfa	Alfalfa caterpillar	0.4 - 0.6
	Alfalfa webworm	0.28 - 1.1
	Beet armyworm	0.6 - 1.1
	Lygus bugs, stink bugs, tarnished plant bug	1.1
Barley, flax, oats, wheat	Armyworms (common, true, western yellow-striped)	0.6
	Beet webworm	0.6 - 1.1
	Bertha armyworm	1.1
Beans	Armyworms, imported cabbageworm, dipterous leaf miner, lygus bugs, stink bug	1.1 - 1.6
Canola	Beet webworm	0.6
	Diamondback moth	1.1
	Lygus bugs	0.55
Corn (field, sweet)	Armyworms, cutworms	0.6 - 1.1
Sugar beet	Beet webworm	0.3 - 0.6
	Dipterous leaf miners	0.6 - 1.1
	Alfalfa webworm, beet armyworm	1.1 - 1.6

7. **Application Tips:** Trichlorfon is a selective insecticide: beneficial insect species are less affected. This selective advantage is lost when product is used in conjunction with or alternated with non-selective pesticides.

   Corn: For early applications to control armyworms and cutworms, spray when plants are 8 - 30 cm high, and direct the spray to the lower portions of the plant. Later applications may be made as full coverage. Do not apply to or allow spray drift onto varieties of sorghum that are sensitive to phosphates.

8. **How it Works:** Trichlorfon is an organophosphate insecticide that works by contact and ingestion.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest or pre-grazing interval (days): alfalfa (14); barley, flax, oats, wheat (21); beans (14); canola (21); corn (0); sugar beets (14). Sugar beets – do not feed tops harvested within 28 days of treatment.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (144), 80% Powder (470), Liquid solution (950). Can cause eye damage and be absorbed through the skin. Intake can cause respiratory failure. Do not apply when bees are actively foraging.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **Keep out of reach of children.**

    Symptoms of poisoning: Tightness in the chest, sweating, contracted pupils, stomach pains, vomiting and diarrhea. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    For physician: Antidote is atropine sulphate administered in large therapeutic doses, repeated as necessary to the point of tolerance. 2-PAM is also antidotal and may be administered in conjunction with atropine. Do **not** give morphine.

12. **Storage:** Store above 0°C and away from excessive heat and open flame. Store in an area specially designated for pesticides. Do not store near any material intended for use or consumption by humans or animals.

Furadan *(carbofuran)*

Manufacturer: **Bayer Inc.**

DANGER POISON

1. **Formulations:** Flowable; Furadan 480; 480 g/L; 4 x 4 L pack, 18.9 L pail.

2. **Registered Mixes:** Furadan 480: all formulations of 2,4-D and MCPA (use only on crops listed on both labels). Compatible with most fungicides. Do not mix with Bordeaux mixture or hydrated lime.

3. **Crops:**
   - canola
   - corn (field, silage, sweet)
   - mustard
   - potatoes
   - sugar beets

4. **Insects Controlled:**
   - aphids
   - Colorado potato beetle
   - European corn borer
   - flea beetles
   - leafhoppers
   - potato flea beetle
   - potato leafhopper
   - sugar beet root maggot
   - tarnished plant bug

5. **When Used:**

   Aphids, Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug: Repeat as necessary.

Furadan (cont'd)

European corn borer: No later than when first feeding is seen on foliage. Follow provincial recommendations based on the moth flight monitoring program.

Flea beetles: (Flowable) Apply when 50% of leaf tissue has been consumed, sooner if growing conditions are poor. Maximum 2 applications per season.

Sugar beet root maggots: One application/season, not within 120 days of harvest. Apply at the very early stage of root maggot activity, usually the first week in June.

6. **How to Apply:**

With: Aircraft (excluding potatoes) or ground equipment.

Rate: Use higher rate for severe infestations of flea beetles.

Crop	Insect	mL/ac
Canola, mustard	Flea beetles	60 - 110
	Red turnip beetle	110
Corn (field, silage, sweet)	European corn borer	445
Potatoes	Aphids, potato flea beetle, potato leafhopper, tarnished plant bug	445
Potatoes	Colorado potato beetle	225
Sugar beets	Sugar beet root maggot	950

Water volume: Air: 8 L/ac minimum. Ground: 40 L/ac minimum. Potatoes: 325 - 405 L/ac. Use sufficient water for thorough coverage.

Sugar beets: 80 L/ac as a drench over the row followed by a light sprinkler irrigation to incorporate Furadan into the soil.

Pressure: Potatoes: 275 kPa minimum.

Nozzles: Flat fan recommended.

7. **Application Tips:** Before seeding, adjust the seeding equipment so that the required weight of seed and Furadan is sown per acre. Mix granules and seed thoroughly. If seed decay, seedling blight or damping-off diseases are a problem, treat seed with a recommended fungicide. Canola and mustard may also require a foliar treatment after seeding with granules. Check fields shortly after emergence. Do not use on fields subject to flooding. Boom sprayers: equip with hydraulic or mechanical agitation and 50 mesh screens; remove any felt filters.

8. **How it Works:** Carbofuran is a broad-spectrum, carbamate insecticide, acaricide and nematicide.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest (PHI) or pre-grazing interval (PGI) (days): mustard (21), canola (60); corn (7 day PHI; 3 day PGI after spraying for European corn borer); potatoes (7). Sugar beet tops and pulp may be fed to livestock without causing residues in milk or meat.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (11), Flowable 480 (38). Highly toxic to bees, waterfowl, birds, fish and other wildlife.

Furadan (cont'd)

European corn borer: No later than when first feeding is seen on foliage. Follow provincial recommendations based on the moth flight monitoring program.

Flea beetles: (Flowable) Apply when 50% of leaf tissue has been consumed, sooner if growing conditions are poor. Maximum 2 applications per season.

Sugar beet root maggots: One application/season, not within 120 days of harvest. Apply at the very early stage of root maggot activity, usually the first week in June.

6. **How to Apply:**

With: Aircraft (excluding potatoes) or ground equipment.

Rate: Use higher rate for severe infestations of flea beetles.

Crop	[illegible]	[illegible]
Canola, mustard	Flea beetles	60 - 110
	Red turnip beetle	110
Corn (field, silage, sweet)	European corn borer	445
Potatoes	Aphids, potato flea beetle, potato leafhopper, tarnished plant bug	445
Potatoes	Colorado potato beetle	225
Sugar beets	Sugar beet root maggot	950

Water volume: Air: 8 L/ac minimum. Ground: 40 L/ac minimum. Potatoes: 325 - 405 L/ac. Use sufficient water for thorough coverage.

Sugar beets: 80 L/ac as a drench over the row followed by a light sprinkler irrigation to incorporate Furadan into the soil.

Pressure: Potatoes: 275 kPa minimum.

Nozzles: Flat fan recommended.

7. **Application Tips:** Before seeding, adjust the seeding equipment so that the required weight of seed and Furadan is sown per acre. Mix granules and seed thoroughly. If seed decay, seedling blight or damping-off diseases are a problem, treat seed with a recommended fungicide. Canola and mustard may also require a foliar treatment after seeding with granules. Check fields shortly after emergence. Do not use on fields subject to flooding. Boom sprayers: equip with hydraulic or mechanical agitation and 50 mesh screens; remove any felt filters.

8. **How it Works:** Carbofuran is a broad-spectrum, carbamate insecticide, acaricide and nematicide.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest (PHI) or pre-grazing interval (PGI) (days): mustard (21), canola (60); corn (7 day PHI; 3 day PGI after spraying for European corn borer); potatoes (7). Sugar beet tops and pulp may be fed to livestock without causing residues in milk or meat.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (11), Flowable 480 (38). Highly toxic to bees, waterfowl, birds, fish and other wildlife.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Blurred vision, nausea, excessive perspiration, weakness, headache, light-headedness, constriction of pupils, cramps, salivation and vomiting. Carbofuran causes reversible cholinesterase inhibition.

    Caution: Seed treated with this product is **extremely** hazardous to livestock and wildlife. Animals may be poisoned due to improper storage, improper drill clean-out or improper disposal of treated seed. Never store this insecticide or treated seed in any area accessible to animals. Clean seed drills away from areas accessible to animals and clean up all treated seed spills immediately. Excess treated seed should be disposed of by double planting.

    Notes to physician: It is a cholinesterase inhibitor. Atropinize slowly to avoid cardiac arrest. Don't use oximes (e.g., 2-PAM).

    Special precautions for burrowing owl: The use of Furadan 480F may pose a hazard to the burrowing owl, a threatened species. The burrowing owl is known to nest in abandoned ground squirrel and badger burrows in specific areas of the southern Prairies. These burrows are commonly found in non-cultivated land such as roadsides, ditchbanks, pastures and rangeland. Areas heavily grazed by livestock and where ground squirrels (gophers) abound are favorite nesting habitats of the burrowing owl. Prior to applying Furadan 480F, the user must determine whether burrowing owls are in or around the area to be treated and must not apply Furadan 480F within 250 meters of burrowing owl nests. Information in identification, range and habits of the burrowing owl can be obtained by calling: Fish and Wildlife Division, Red Deer (340-5142) or Lethbridge (381-5281).

12. **Storage:** Do not store below 2°C.

Gastoxin/Phostoxin

(aluminum phosphide)

DANGER POISON

Distributors **Abell Pest Control Inc/United Agri Products (Restricted Use)**

1. **Formulations:**
   Tablets (3 g); release 1.0 g phosphine upon decomposition.
   Pellets (0.6 g); release 0.2 g phosphine upon decomposition.
   Sache (34 g); release 11.0 g phosphine upon decomposition.
   Order directly – Gastoxin – Garden City Ag. Supplies: 1-888-320-8101; Phostoxin – Garden City Ag. Supplies: 1-888-320-8101; Gardex Chemicals Ltd.: 1-204-989-4790 (Collect).

2. **Registered Mixes:** None.

3. **Crops:** Raw agricultural products, grain or feeds.

4. **Insects Controlled:**
   - Angoumois grain moth
   - bean weevil
   - cadelle
   - cigarette beetle
   - dermestids
   - dried fruit moth
   - flour beetles
   - granary weevils
   - Indian meal moth
   - khapra beetle
   - lesser grain borer
   - Mediterranean flour moth
   - rusty grain beetle
   - saw-toothed grain beetle

5. **When Used:** When the temperature is above 5°C.

6. How to Apply:

Rate:

Uses	Tablets
Raw agricultural commodities, animal feeds and processed foods	4 - 6/m^3

Commodity temp. °C	Exposure times (days)
over 20	3
16 - 20	4
12 - 15	5
5 - 11	10
below 5	Do not fumigate

Note: Suggested exposures should be observed. A shortened exposure period cannot be compensated for by increased dosage.

7. Application Tips:

General: Never fumigate alone. Never fumigate any structure occupied by man or animals or physically adjoining another structure occupied by man or animals. Personnel involved in fumigation must leave the structure within 2 hours of starting fumigation. Person supervising must be a licensed fumigator and personnel assisting must be trained and appropriately licensed in the use of aluminum phosphide.

Fumigating grain storages: Make sure the structure is tight enough to retain the fumigant. Seal the structure as necessary. During fumigation leave all doors, vents, etc. open to create a cross-ventilation in the structure. Tablets may be probed into grain or fed into the grain stream as the grain is transferred from one bin to another. Probing requires a pipe 3 cm in diameter and long enough to reach within 1.5 m of the bottom of the storage. Probes are made in a 1.5 m horizontal grid across the grain surface. Fumigant tablets are dropped down the pipe at 15 cm intervals as the pipe is withdrawn from the grain. The objective is to distribute the tablets as evenly as possible throughout the grain mass. To achieve the proper dosage when treating a stream, apply the tablets uniformly to the grain stream based on flow rate. After application, all openings should be sealed and entries locked and placarded. After the exposure period, open doors and windows for aeration. Remove all warning placards when aeration is complete.

8. How it Works: Phosphine (hydrogen phosphide) is a colorless gas with a carbide-like odour and high volatility. Formulated product consists of aluminium phosphide, ammonium bicarbonate, urea and paraffin. Upon exposure to air, the ammonium bicarbonate breaks down to form ammonia (a pungent, warning gas) and carbon dioxide (a fire suppressant). Within 1 - 4 hours, depending on temperature and humidity, the product begins to decompose and release phosphine. After decomposition, there remains a grey-white dust composed almost entirely of non-poisonous aluminum hydroxide with trace amounts of undecomposed aluminum phosphide. The dust is eliminated when raw agricultural commodities are moved.

Expected results: The effectiveness of this product depends on the fumigation achieved by the release of phosphine gas. Therefore, tightness of the area to be fumigated and temperature of the commodity are essential when determining dosage rates and exposure rates. The tighter the bin and the warmer the temperature of the commodity, the lower the dosage required and vice versa.

9. Grazing, Cropping and Other Restrictions: Aerate finished food for 48 hours before it is offered to the consumer.

10. Toxicity: Hydrogen phosphide gas is very toxic to all forms of animal life, and exposure to even small amounts should be prevented. Poisoning results from ingestion or inhalation as hydrogen phosphide is not absorbed through the skin. It is also insoluble in water, fats and oils.

11. Precautions, First Aid:

Protective equipment: It will be necessary to wear a gas mask if the treated area is entered prior to aeration. It is not necessary to wear a gas mask when product is applied according to label directions. Wear gloves of cotton or other breathable material when handling the product. Only open containers in open air and with the opening pointing away from your face. Wash hands after use of the product.

Gastoxin/Phostoxin (cont'd)

6. How to Apply:

Rate:

[illegible]	[illegible]
Raw agricultural commodities, animal feeds and processed foods	4 - 6/m^3
Commodity temp, °C	**[illegible]**
over 20	3
16 - 20	4
12 - 15	5
5 - 11	10
below 5	Do not fumigate

Note: Suggested exposures should be observed. A shortened exposure period cannot be compensated for by increased dosage.

7. Application Tips:

General: Never fumigate alone. Never fumigate any structure occupied by man or animals or physically adjoining another structure occupied by man or animals. Personnel involved in fumigation must leave the structure within 2 hours of starting fumigation. Person supervising must be a licensed fumigator and personnel assisting must be trained and appropriately licensed in the use of aluminum phosphide.

Fumigating grain storages: Make sure the structure is tight enough to retain the fumigant. Seal the structure as necessary. During fumigation leave all doors, vents, etc. open to create a cross-ventilation in the structure. Tablets may be probed into grain or fed into the grain stream as the grain is transferred from one bin to another. Probing requires a pipe 3 cm in diameter and long enough to reach within 1.5 m of the bottom of the storage. Probes are made in a 1.5 m horizontal grid across the grain surface. Fumigant tablets are dropped down the pipe at 15 cm intervals as the pipe is withdrawn from the grain. The objective is to distribute the tablets as evenly as possible throughout the grain mass. To achieve the proper dosage when treating a stream, apply the tablets uniformly to the grain stream based on flow rate. After application, all openings should be sealed and entries locked and placarded. After the exposure period, open doors and windows for aeration. Remove all warning placards when aeration is complete.

8. How it Works:

Phosphine (hydrogen phosphide) is a colorless gas with a carbide-like odour and high volatility. Formulated product consists of aluminium phosphide, ammonium bicarbonate, urea and paraffin. Upon exposure to air, the ammonium bicarbonate breaks down to form ammonia (a pungent, warning gas) and carbon dioxide (a fire suppressant). Within 1 - 4 hours, depending on temperature and humidity, the product begins to decompose and release phosphine. After decomposition, there remains a grey-white dust composed almost entirely of non-poisonous aluminum hydroxide with trace amounts of undecomposed aluminum phosphide. The dust is eliminated when raw agricultural commodities are moved.

Expected results: The effectiveness of this product depends on the fumigation achieved by the release of phosphine gas. Therefore, tightness of the area to be fumigated and temperature of the commodity are essential when determining dosage rates and exposure rates. The tighter the bin and the warmer the temperature of the commodity, the lower the dosage required and vice versa.

9. Grazing, Cropping and Other Restrictions:

Aerate finished food for 48 hours before it is offered to the consumer.

10. Toxicity:

Hydrogen phosphide gas is very toxic to all forms of animal life, and exposure to even small amounts should be prevented. Poisoning results from ingestion or inhalation as hydrogen phosphide is not absorbed through the skin. It is also insoluble in water, fats and oils.

11. Precautions, First Aid:

Protective equipment: It will be necessary to wear a gas mask if the treated area is entered prior to aeration. It is not necessary to wear a gas mask when product is applied according to label directions. Wear gloves of cotton or other breathable material when handling the product. Only open containers in open air and with the opening pointing away from your face. Wash hands after use of the product.

Reduce gas hazards: Never let tablets come in direct contact with liquid – this contact causes the immediate release of hydrogen phosphide. **Never** open a container except for immediate usage. **Never** confine the product in small gas proof enclosures such as plastic bags. Such confinement could cause the gas concentration to reach the lower flammability level. Take precautions in areas where copper, brass or gold are present, as corrosion may occur. **Never** fumigate in areas containing electronic or telephone equipment, photographic film or copy paper. Remove such items or protect them from exposure to the gas. Hydrogen phosphide has great penetrating power, and gas may slowly seep through concrete block walls. Hydrogen phosphide does not layer, but expands to fill the available space.

Symptoms of poisoning: Severity depends on concentration of hydrogen phosphide involved. **Mild poisoning** results in fatigue, nausea, pressure or pain in the chest, ringing in the ears and uneasiness. Hydrogen phosphide is not a chronic poison, and these symptoms will readily disappear with rest and fresh air. **Greater quantities of gas** produce such symptoms as vomiting, stomach ache, diarrhea, disturbance in equilibrium and dyspnea (difficulty in breathing). Very high concentrations quickly cause bluish-purple skin color, agitation, poor muscle co-ordination, sub-normal blood oxygen content, unconsciousness and death. Death can occur very quickly or be delayed several days as a result of pulmonary edema and collapse, by paralysis of the central respiratory system. In cases of severe poisoning, disturbance in liver and kidney function can also occur.

First aid: Should exposure to hydrogen phosphide be documented or suspected – remove patient from gas atmosphere to open air. **Call a physician immediately.** Have the patient lie down, keeping him warm and comfortable. Treat as for shock. Make **no** antidotal use of fats, oil, butter or milk. Do **not** administer atropine as it is contraindicative. Begin artificial respiration if breathing has ceased. When exposure to low concentrations of hydrogen phosphide have been documented or suspected, the individual involved should rest for 24 hours, and under no circumstances should he resume any work dealing with fumigation. If ingested, induce vomiting by touching the back of the throat with a blunt object.

12. **Storage:** Tablets are received in resealable flasks. As long as flasks remain intact, the storage life of the product is unlimited. Storage should be in a dry, locked, ventilated area and out of the reach of children and irresponsible persons.

Guthion/APM/Sniper

(azinphos-methyl)

Manufacturer: **Bayer Zeneca Agro/United Agri Products**

DANGER POISON

1. **Formulations:** Spray Concentrate (SC); 240 g/L; 20 L pail; water soluble bag – 500 gm; 2 kg bag (50W).
2. **Registered Mixes:** None.

   Mixing instructions: Wettable Powder: mix the required amount with a small quantity of water. Add this pre-mix through the screen while filling the sprayer tank, or fill the tank to the required level and then add the pre-mix. Operate the agitator while mixing. Spray Concentrate: pour the required amount into full amount of water and then agitate.
3. **Crops:** Alfalfa, clover, potatoes, rye.
4. **Insects Controlled:**
   - alfalfa plant bug
   - alfalfa weevil
   - Colorado potato beetle
   - diamondback moth
   - flea beetles
   - grasshoppers
   - leafhoppers
   - lygus bugs
   - red turnip beetle
   - spittle bug
   - sweet clover weevil
   - tarnished plant bug
5. **When Used:** Maximum number of applications: one per season on rye. One per season on alfalfa and clover, except 2 per season for sweet clover weevil control or when using rates of 910 mL SC/ac or less. Repeat as necessary on potatoes to a maximum of 3 applications per season.

6. **How to Apply:**

With: Ground equipment. May be applied by air only on alfalfa, clover and rye.

Rate: Lower rate on immature insects, light infestations or sparse foliage.

[illegible]	[illegible]	[illegible]	[illegible]
Alfalfa, clover	Alfalfa plant bug, alfalfa weevil, aphids, leafhoppers, lygus bugs, mites, spittle bugs	900 - 1400	450 - 700
	Grasshoppers	440 - 700	210 - 340
	Sweet clover weevil	900	450
Rye	Grasshoppers	700 - 900	210 - 340
	Cereal leaf beetle	440 - 700	340 - 450
Potato	Colorado potato beetle	700	340
Potato	Flea beetle, leafhoppers, spittle bug, tarnished plant bug	900 - 1400	445 - 710

Water volume: Air: 16 L/ac minimum. Ground: 32 L/ac minimum. Alfalfa weevil: 60 - 80 L/ac on heavy growth.

7. **Application Tips:** Do not apply when crop is in bloom.

8. **How it Works:** Azinphos-methyl is a contact, non-systemic, organophosphate insecticide and acaricide.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest or pre-grazing interval (days): alfalfa, clover (21); rye (30); potatoes (7). Re-entry interval: 48 hours. Do not plant root crops other than those with registered azinphos-methyl uses in azinphos-methyl treated soil sooner than 6 months after last application. Do not plant any other crop other than those with registered azinphos-methyl uses in treated soil sooner than 30 days after last application.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (11), 50% Wettable powder (34), spray concentrate (21). Highly toxic to bees exposed to direct treatment or residues on crops. Poisonous if swallowed, inhaled, or absorbed through the skin.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Keep out of reach of children. **Do not contaminate feed or food.**

    Symptoms of poisoning: Tightness in the chest, sweating, contracted pupils, stomach pains, vomiting and diarrhea.

    First aid: Call a physician immediately. Have patient lie down and keep quiet. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    For physician: Compound inhibits cholinesterase, resulting in stimulation of the central nervous system, the parasympathetic nervous system and the somatic motor nerves. Do **not** give morphine. Watch for pulmonary edema which may develop in serious cases of poisoning even after 12 hours. At first sign of pulmonary edema, the patient should be placed in an oxygen tent and treated symptomatically. **Antidote is atropine sulphate** in large therapeutic doses. Repeat as necessary to the point of tolerance. 2-PAM is also antidotal and may be administered in conjunction with atropine.

12. **Storage:** Do not store spray concentrate below -4°C. Protect products from heat and open flame. Do not heat.

Lannate *(methomyl)*

Manufacturer: DuPont

DANGER POISON CAUTION FLAMMABLE

1. **Formulations:** Soluble powder; 90%; 24 x 225 g Toss-N-Go water soluble pouches; 5.4 kg/case. Liquid formulation: 10 L per jug, 2 jugs/case.
2. **Registered Mixes:**

   Mixing instructions: Fill spray tank 1/4 - 1/2 full of water. Add the appropriate number of water soluble pouches directly to spray tank, mix thoroughly. Once dissolved, continued agitation is not required. Do not use air agitation, use mechanical or hydraulic agitation.
3. **Crops:** Barley, canola, corn (sweet), flax, oats, potatoes, wheat.
4. **Insects Controlled:**

   alfalfa lopper
   aphids
   armyworm (Bertha, common)
   beet webworm
   corn earworm
   cutworm (clover, variegated)
   European corn borer
   flax bollworm
   flea beetle
   leafhopper
   thrips
5. **When Used:** When insects are causing economic damage; applications at 5 - 7 days intervals as needed. No restriction on number of applications. Early morning or late evening sprays are recommended.

   Corn earworm and European corn borer: At 3 - 5 day intervals as needed.
6. **How to Apply:** Refer to the label for application instructions.

   With: Aircraft (barley, canola, flax, oats, wheat) or ground equipment (all crops).

   Rate: Low rate only for very young insects, small plants or light infestations.

Barley, oats, wheat	Common armyworm	100 - 210	Corn (sweet)	Corn earworm, Aphids	175 - 250
	Thrips	120		European corn borer	250
Canola	Alfalfa looper, Bertha armyworm, beet webworm, clover cutworm	87 - 200	Flax	Bertha armyworm, flax bollworm	87 - 110
			Peas	Aphids, alfalfa looper	200
			Potato	Aphids, flea beetles, leafhoppers	215

   Water volume: Air: 9 L/ac minimum. Ground: 40 - 140 L/ac.
7. **Application Tips:** Refer to the label for application instructions.
8. **How it Works:** A carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short-term residual. Rapid knock-down.
9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): barley, oats, wheat (20); canola, flax (8); corn (sweet), potatoes (3).
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (17 - 24). Toxic to bees. May be fatal or cause blindness if swallowed. Poisonous if inhaled. Causes eye damage. Can be absorbed through the skin. Intake can cause heart, liver and kidney damage.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Aircraft pilot should not assist in the mixing and loading operation.

    Symptoms of poisoning: Weakness, blurred vision, headache, nausea, abdominal cramps, discomfort in the chest, constriction of pupils, sweating, slow pulse or muscle tremors.

    For physician: Administer atropine sulphate in repeated doses, 1.2 - 2.0 mg intravenously every 10 - 30 minutes until full atropinization is achieved. Maintain atropinization until patient recovers. Do **not** use morphine. 2-PAM may be used to supplement atropine treatment.

Guthion/APM/Sniper (cont'd)

6. **How to Apply:**

   With: Ground equipment. May be applied by air only on alfalfa, clover and rye.

   Rate: Lower rate on immature insects, light infestations or sparse foliage.

Crop	Insect	Liquid mL/ac	Powder g/ac
Alfalfa, clover	Alfalfa plant bug, alfalfa weevil, aphids, leafhoppers, lygus bugs, mites, spittle bugs	900 - 1400	450 - 700
	Grasshoppers	440 - 700	210 - 340
	Sweet clover weevil	900	450
Rye	Grasshoppers	700 - 900	210 - 340
	Cereal leaf beetle	440 - 700	340 - 450
Potato	Colorado potato beetle	700	340
Potato	Flea beetle, leafhoppers, spittle bug, tarnished plant bug	900 - 1400	445 - 710

   Water volume: Air: 16 L/ac minimum. Ground: 32 L/ac minimum. Alfalfa weevil: 60 - 80 L/ac on heavy growth.

7. **Application Tips:** Do not apply when crop is in bloom.
8. **How it Works:** Azinphos-methyl is a contact, non-systemic, organophosphate insecticide and acaricide.
9. **Grazing, Cropping and Other Restrictions:** Pre-harvest or pre-grazing interval (days): alfalfa, clover (21); rye (30); potatoes (7). Re-entry interval: 48 hours. Do not plant root crops other than those with registered azinphos-methyl uses in azinphos-methyl treated soil sooner than 6 months after last application. Do not plant any other crop other than those with registered azinphos-methyl uses in treated soil sooner than 30 days after last application.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (11), 50% Wettable powder (34), spray concentrate (21). Highly toxic to bees exposed to direct treatment or residues on crops. Poisonous if swallowed, inhaled, or absorbed through the skin.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Keep out of reach of children. **Do not contaminate feed or food.**

    Symptoms of poisoning: Tightness in the chest, sweating, contracted pupils, stomach pains, vomiting and diarrhea.

    First aid: Call a physician immediately. Have patient lie down and keep quiet. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    For physician: Compound inhibits cholinesterase, resulting in stimulation of the central nervous system, the parasympathetic nervous system and the somatic motor nerves. Do **not** give morphine. Watch for pulmonary edema which may develop in serious cases of poisoning even after 12 hours. At first sign of pulmonary edema, the patient should be placed in an oxygen tent and treated symptomatically. **Antidote is atropine sulphate** in large therapeutic doses. Repeat as necessary to the point of tolerance. 2-PAM is also antidotal and may be administered in conjunction with atropine.
12. **Storage:** Do not store spray concentrate below -4°C. Protect products from heat and open flame. Do not heat.

Lannate *(methomyl)*

Manufacturer: **DuPont**

DANGER POISON CAUTION FLAMMABLE

1. **Formulations:** Soluble powder; 90%; 24 x 225 g Toss-N-Go water soluble pouches; 5.4 kg/case. Liquid formulation: 10 L per jug, 2 jugs/case.
2. **Registered Mixes:**

   Mixing instructions: Fill spray tank 1/4 - 1/2 full of water. Add the appropriate number of water soluble pouches directly to spray tank, mix thoroughly. Once dissolved, continued agitation is not required. Do not use air agitation, use mechanical or hydraulic agitation.
3. **Crops:** Barley, canola, corn (sweet), flax, oats, potatoes, wheat.
4. **Insects Controlled:**

   alfalfa lopper
   aphids
   armyworm (Bertha, common)
   beet webworm
   corn earworm
   cutworm (clover, variegated)
   European corn borer
   flax bollworm
   flea beetle
   leafhopper
   thrips
5. **When Used:** When insects are causing economic damage; applications at 5 - 7 days intervals as needed. No restriction on number of applications. Early morning or late evening sprays are recommended.

   Corn earworm and European corn borer: At 3 - 5 day intervals as needed.
6. **How to Apply:** Refer to the label for application instructions.

   With: Aircraft (barley, canola, flax, oats, wheat) or ground equipment (all crops).

   Rate: Low rate only for very young insects, small plants or light infestations.

Crop	Insect	g/ac	Crop	Insect	g/ac
Barley, oats, wheat	Common armyworm	100 - 210	Corn (sweet)	Corn earworm, Aphids	175 - 250
	Thrips	120		European corn borer	250
Canola	Alfalfa looper, Bertha armyworm, beet webworm, clover cutworm	87 - 200	Flax	Bertha armyworm, flax bollworm	87 - 110
			Peas	Aphids, alfalfa looper	200
			Potato	Aphids, flea beetles, leafhoppers	215

   Water volume: Air: 9 L/ac minimum. Ground: 40 - 140 L/ac.
7. **Application Tips:** Refer to the label for application instructions.
8. **How it Works:** A carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short-term residual. Rapid knock-down.
9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): barley, oats, wheat (20); canola, flax (8); corn (sweet), potatoes (3).
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (17 - 24). Toxic to bees. May be fatal or cause blindness if swallowed. Poisonous if inhaled. Causes eye damage. Can be absorbed through the skin. Intake can cause heart, liver and kidney damage.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Aircraft pilot should not assist in the mixing and loading operation.

    Symptoms of poisoning: Weakness, blurred vision, headache, nausea, abdominal cramps, discomfort in the chest, constriction of pupils, sweating, slow pulse or muscle tremors.

    For physician: Administer atropine sulphate in repeated doses, 1.2 - 2.0 mg intravenously every 10 - 30 minutes until full atropinization is achieved. Maintain atropinization until patient recovers. Do **not** use morphine. 2-PAM may be used to supplement atropine treatment.

Lannate (cont'd)

Decontamination:

Spill or leak procedure: Do not get in eyes, on skin or on clothing. Keep people away and upwind of spill/leak. If necessary to enter the spill area, wear self-contained breathing apparatus, gloves, boots and protective clothing. Remove leaking containers and put them into leak-proof containers. Sweep up spills; apply earth, sand or sweeping compound to spill area and re-sweep to pick up residue. Package spill material in plastic, cardboard or metal containers; dispose in accordance with provinicial regulations. If product enters crevices and cannot be effectively swept, treat with a sodium hydroxide (Drano) water solution and allow to stand 4 hours. Thereafter, flush well with water; do not flush into any body of water. If product enters sewers or bodies of water, notify appropriate local and federal authorities.

12. **Storage:** Store product in original container only. Store away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Do not allow the product to freeze.

Lorsban 4E/Pyrinex 480 EC

(chlorpyrifos)

[illegible]

Manufacturer: Dow Agrosciences United Agri Products

DANGER POISON

1. **Formulations:** Emulsifiable Concentrate; 480 g/L; 10 L jug, 115 L returnable container.
2. **Registered Mixes:** Avenge 200C, Banvel, Buctril M, 2,4-D Amine, 2,4-D Ester, MCPA Amine, MCPA Ester.

   Mixing restrictions: Do not add adjuvants, surfactants or spreader stickers other than those allowed on mixing partner label. When tank mixing, first add the herbicide to spray tank, then add Lorsban 4E.
3. **Crops:** Barley, canola, corn (field, sweet), flax, lentils, oats, potatoes, sugar beets, sunflowers, wheat.
4. **Insects Controlled:**

   alfalfa looper
   armyworm (Bertha, common)
   Colorado potato beetle larvae
   cutworms (army, black, dark-sided, pale western red-backed, variegated)
   diamondback moth larvae
   grasshoppers
   lygus bug
   potato flea beetle
   Russian wheat aphid
   Sunflower seed weevil
   tarnished plant bug
   wheat midge
5. **When Used:** When economic damage is apparent or when insect numbers reach the economic threshold.

   Wheat midge: When adults are found in crop (1 midge/4 - 5 wheat heads). When 25% of wheat head has emerged from boot, but preferably delayed until flowering (in 30% of crop).

   Number of applications: Once per season as a foliar, seedling or soil treatment. Maximum of 9 weekly applications on potato foliage.

6. How to Apply:

With: Aircraft or ground equipment.

Rate: Use lower rate for young insects, light infestations or sparse foliage.

[illegible]	[illegible]	[illegible]	mL/ha
Barley, oats, wheat	foliage	Armyworm, cutworms (army, dark-sided, pale western, red-backed)	355 - 485
		Grasshopper (nymphs)	235
		Grasshopper (adults)	355
		Brown wheat mite	250
		Russian wheat aphid	202
		Wheat midge	335 - 405
Canola	foliage	Alfalfa looper, armyworms (Bertha, common)	305 - 405
		Diamondback moth larvae, lygus bug	405 - 605
		Grasshoppers	235 - 355
Canola, flax	seedling	Cutworms (army, dark-sided, pale western, red-backed, variegated)	355 - 485
Corn (field, sweet), potatoes	seedling	Cutworms (black, dark-sided, red-backed)	485 - 970
	preplant	Cutworms (black, dark-sided, red-backed)	970
Flax	seedling	Bertha armyworm	305 - 405
Lentils (Lorsban only)	seedling	Pale western cutworm	355 - 485
Lentils (Lorsban only)	seedling	Cutworms	275 - 485
Lentils (Lorsban only)	foilage	Grasshoppers	235 - 485
Potatoes	foliage	Colorado potato beetle, potato flea beetle, tarnished plant bug	405
Sugar beets	seedling	Cutworms (pale western, red-backed)	485 - 970
Sunflower	seedling	Cutworms (army, pale western, red-backed), seed weevils	485

Water volume:

Air: 4 - 12 L spray solution/acre.

Ground: 20 - 80 L spray solution/acre.

Nozzles: Flat fan recommended.

7. Application Tips: Uniform coverage of crop is essential: use a boom configuration that provides optimum coverage.

Cutworms: Higher rates when the top 1 cm of soil surface is extremely dry or when the infestation is heavy.

Foliage treatments: When spraying crops near maturity, an application system that gives maximum penetration of the crop canopy is necessary to get good insect kill. Do not apply to crops in bloom. Best results will be obtained when application is made during early evening.

8. How it Works: A broad-spectrum, non-systemic insecticide. Works by contact, ingestion and vapour action.

Expected Results: Insects must come in direct contact with the insecticide to be affected. Degrades on foliage by weathering, and a significant kill of insects eating treated foliage may not last beyond 48 hours after treatment. Somewhat more persistent in soil; control of soil-dwelling insects may be more durable.

Effects of rainfall:

Foliar treatments: Should be made 4 - 6 hours before forecast rainfall.

Soil treatment: Do not apply if heavy rainfall is forecast. A light rainfall during or after application is probably helpful.

Movement in soil: Binds to organic matter in soil and is not likely to leach in soils with some organic matter.

6. How to Apply:

With: Aircraft or ground equipment.

Rate: Use lower rate for young insects, light infestations or sparse foliage.

Crop	Stage	Insect	mL/ac
Barley, oats, wheat	foliage	Armyworm, cutworms (army, dark-sided, pale western, red-backed)	355 - 485
		Grasshopper (nymphs)	235
		Grasshopper (adults)	355
		Brown wheat mite	250
		Russian wheat aphid	202
		Wheat midge	335 - 405
Canola	foliage	Alfalfa looper, armyworms (Bertha, common)	305 - 405
		Diamondback moth larvae, lygus bug	405 - 605
		Grasshoppers	235 - 355
Canola, flax	seedling	Cutworms (army, dark-sided, pale western, red-backed, variegated)	355 - 485
Corn (field, sweet), potatoes	seedling	Cutworms (black, dark-sided, red-backed)	485 - 970
	preplant	Cutworms (black, dark-sided, red-backed)	970
Flax	seedling	Bertha armyworm	305 - 405
Lentils (Lorsban only)	seedling	Pale western cutworm	355 - 485
Lentils (Lorsban only)	seedling	Cutworms	275 - 485
Lentils (Lorsban only)	foilage	Grasshoppers	235 - 485
Potatoes	foliage	Colorado potato beetle, potato flea beetle, tarnished plant bug	405
Sugar beets	seedling	Cutworms (pale western, red-backed)	485 - 970
Sunflower	seedling	Cutworms (army, pale western, red-backed), seed weevils	485

Water volume:

Air: 4 - 12 L spray solution/acre.

Ground: 20 - 80 L spray solution/acre.

Nozzles: Flat fan recommended.

7. Application Tips: Uniform coverage of crop is essential: use a boom configuration that provides optimum coverage.

Cutworms: Higher rates when the top 1 cm of soil surface is extremely dry or when the infestation is heavy.

Foliage treatments: When spraying crops near maturity, an application system that gives maximum penetration of the crop canopy is necessary to get good insect kill. Do not apply to crops in bloom. Best results will be obtained when application is made during early evening.

8. How it Works: A broad-spectrum, non-systemic insecticide. Works by contact, ingestion and vapour action.

Expected Results: Insects must come in direct contact with the insecticide to be affected. Degrades on foliage by weathering, and a significant kill of insects eating treated foliage may not last beyond 48 hours after treatment. Somewhat more persistent in soil; control of soil-dwelling insects may be more durable.

Effects of rainfall:

Foliar treatments: Should be made 4 - 6 hours before forecast rainfall.

Soil treatment: Do not apply if heavy rainfall is forecast. A light rainfall during or after application is probably helpful.

Movement in soil: Binds to organic matter in soil and is not likely to leach in soils with some organic matter.

Lorsban 4E/Pyrinex 480 EC (cont'd)

9. **Grazing, Cropping and Other Restrictions:** Wait-interval for canola is counted from treatment to day of processing. Cover crop treated with Lorsban should not be used for human or animal consumption. Pre-harvest interval (days): Foliage: barley, oat, wheat (60); canola (21); potato (7). Seedling: canola, flax, lentils (21); potatoes (7); sugar beets, sunflowers (90); corn (2 - 5 leaf stage).
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (135 - 163). Toxic to fish. Toxic to bees exposed to direct treatment or residues on blooming crops and weeds. Avoid use when bees are actively foraging.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**

    Symptoms of poisoning by inhalation: Stuffy, runny nose, scratchy throat, asthmatic wheezing, sudden bronchospasm, swelling of oral and laryngeal mucous membranes, shock.

    For physician: Contains a cholinesterase inhibitor and a solvent. **Antidote is atropine**.
12. **Storage:** Combustible liquid; keep away from heat, sparks and open flame.

Malathion/ Fyfanon 50% EC *(malathion)*

Manufacturer: **United Agri Products/IPCO/Cheminova**

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrates; Malathion (500, 50EC, 5E); 500 g/L; 4 x 4 pack; 2 x 10 L. Dust: 2% Malathion; 2%; 22.7 kg bag. Grain Protectant; 0.5%; 20 kg bag. Fyfanon 50% EC, 500 g/L, 10 L jug.
2. **Registered Mixes:**
3. **Crops:** Alfalfa, barley, canary seed, canola, clover, corn, flax, lentils, mustard, oats, pasture, potatoes, rye, stored grain, sugar beets, sweet clover, wheat.
4. **Insects Controlled:**

Foliar spray

alfalfa weevil larvae
aphids
army worms
Colorado potato beetles
corn earworm
diamondback moth larvae
English grain aphid
European corn borer
flea beetles
grasshoppers
greenbug
leafhoppers
lygus bug
spider mite
spittle bug (adults)
sweet clover weevil
winter grain mite

Stored grain treatment

grain beetles (flat, rusty, saw-toothed)
grain mites
flour beetles (confused, red)
Indian meal moth
lesser grain borer
weevils (granary, rice)

5. **When Used:**

Foliar spray: Legumes – when economic thresholds are reached. Do not apply to legumes in bloom. Sweet clover – spray field margins of first year clover in late summer or early fall when migration of weevil adults is occurring. Canola, flax – when bees are absent from field and temperatures is above 18°C. Sugar Beets – at 3 - 5 leaf stage when insects or damage first appears.

Stored grain treatments: As grain is being loaded or turned into final storage. Surface protectant – immediately after grain is loaded into storage.

Storage protectant: Prior to filling of grain storage structures.

6. How to Apply:

(A) Emulsifiable Concentrates

With: Aircraft or ground equipment.

Rate: Use lower rate for immature insects, light infestations or sparse foliage.

Crop	Insect	L/ac
Alfalfa	Alfalfa weevil larvae, lygus bug, spittle bug adults	0.9 - 1.1
Alfalfa, clover	Aphids, grasshoppers, leafhoppers, spider mite	0.9 - 1.1
Canola, mustard	Flea beetles	0.4 - 1.1
	Diamondback moth larvae	0.2 - 0.3
Canola, mustard, flax, pastures	Grasshoppers	0.4 - 1.1
Canary seed	Aphids	0.6
Cereals	Armyworms, English grain aphid, greenbug, winter grain mite	0.4 - 1.1
	Cereal leaf beetle	0.9
Cereals, hay	Grasshoppers	1.1
Corn (grain, forage)	Corn earworm, European corn borer	0.9 - 1.1
Lentils	Grasshoppers	0.7
Potatoes	Aphids, Colorado potato beetle, leafhoppers	0.6 - 0.9
Sugar beets	Flea beetles	0.4
Sweet clover	Sweet clover weevil	0.6 - 1.0

Water volume: Potato pests – 400 L/ac.

Nozzles: Flat fan recommended.

(B) Stored grain treatments

With: Spray or dust applicators.

Rate:

Note: The Canadian Grain Commission does not recommend the use of grain protectants. Malathion is more effective in dry grain than in tough or damp grain because the pesticide breaks down rapidly.

Insect	Grain	Liquid g/1000 kg grain	0.5% Dusts g/1000 kg grain	2.0% Dusts
Grain beetles (flat, rusty, saw-toothed); grain mites; lesser grain borers; flour beetles (confused, red); weevils (granary, rice); Indian meal moth.	Barley	12	2000	520
	Corn	10	—	—
	Oats	17	3000	735
	Rye	10	1750	450
	Wheat	10	1750	415
Indian meal moth	Barley, corn, oats, rye, wheat	300 mL/100 m² of grain surface	—	—

Water volume: 10 - 20 L water; Indian meal moth (surface treatment) 5 - 10 L water.

Incorporation: Add to grain as it is being augered, or scatter proper amount of dust on each load and cut in with shovel before dumping.

Lorsban 4E/Pyrinex 480 EC (cont'd)

9. **Grazing, Cropping and Other Restrictions:** Wait-interval for canola is counted from treatment to day of processing. Cover crop treated with Lorsban should not be used for human or animal consumption. Pre-harvest interval (days): Foliage: barley, oat, wheat (60); canola (21); potato (7). Seedling: canola, flax, lentils (21); potatoes (7); sugar beets, sunflowers (90); corn (2 - 5 leaf stage).
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (135 - 163). Toxic to fish. Toxic to bees exposed to direct treatment or residues on blooming crops and weeds. Avoid use when bees are actively foraging.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**

    Symptoms of poisoning by inhalation: Stuffy, runny nose, scratchy throat, asthmatic wheezing, sudden bronchospasm, swelling of oral and laryngeal mucous membranes, shock.

    For physician: Contains a cholinesterase inhibitor and a solvent. **Antidote is atropine**.
12. **Storage:** Combustible liquid; keep away from heat, sparks and open flame.

Malathion/ Fyfanon 50% EC *(malathion)*

Manufacturer: **United Agri Products/IPCO/Cheminova**

CAUTION POISON

1. **Formulations:** Emulsifiable Concentrates; Malathion (500, 50EC, 5E); 500 g/L; 4 x 4 pack; 2 x 10 L. Dust: 2% Malathion; 2%; 22.7 kg bag. Grain Protectant; 0.5%; 20 kg bag. Fyfanon 50% EC, 500 g/L, 10 L jug.
2. **Registered Mixes:**
3. **Crops:** Alfalfa, barley, canary seed, canola, clover, corn, flax, lentils, mustard, oats, pasture, potatoes, rye, stored grain, sugar beets, sweet clover, wheat.
4. **Insects Controlled:**

Foliar spray

alfalfa weevil larvae
aphids
army worms
Colorado potato beetles
corn earworm
diamondback moth larvae
English grain aphid
European corn borer
flea beetles
grasshoppers
greenbug
leafhoppers
lygus bug
spider mite
spittle bug (adults)
sweet clover weevil
winter grain mite

Stored grain treatment

grain beetles (flat, rusty, saw-toothed)
grain mites
flour beetles (confused, red)
Indian meal moth
lesser grain borer
weevils (granary, rice)

5. **When Used:**

    Foliar spray: Legumes – when economic thresholds are reached. Do not apply to legumes in bloom. Sweet clover – spray field margins of first year clover in late summer or early fall when migration of weevil adults is occurring. Canola, flax – when bees are absent from field and temperatures is above 18°C. Sugar Beets – at 3 - 5 leaf stage when insects or damage first appears.

Stored grain treatments: As grain is being loaded or turned into final storage. Surface protectant – immediately after grain is loaded into storage.

Storage protectant: Prior to filling of grain storage structures.

6. How to Apply:

(A) Emulsifiable Concentrates

With: Aircraft or ground equipment.

Rate: Use lower rate for immature insects, light infestations or sparse foliage.

Crop	Insect	L/ac
Alfalfa	Alfalfa weevil larvae, lygus bug, spittle bug adults	0.9 - 1.1
Alfalfa, clover	Aphids, grasshoppers, leafhoppers, spider mite	0.9 - 1.1
Canola, mustard	Flea beetles	0.4 - 1.1
	Diamondback moth larvae	0.2 - 0.3
Canola, mustard, flax, pastures.	Grasshoppers	0.4 - 1.1
Canary seed	Aphids	0.6
Cereals	Armyworms, English grain aphid, greenbug, winter grain mite	0.4 - 1.1
	Cereal leaf beetle	0.9
Cereals, hay	Grasshoppers	1.1
Corn (grain, forage)	Corn earworm, European corn borer	0.9 - 1.1
Lentils	Grasshoppers	0.7
Potatoes	Aphids, Colorado potato beetle, leafhoppers	0.6 - 0.9
Sugar beets	Flea beetles	0.4
Sweet clover	Sweet clover weevil	0.6 - 1.0

Water volume: Potato pests – 400 L/ac.

Nozzles: Flat fan recommended.

(B) Stored grain treatments

With: Spray or dust applicators.

Rate:

Note: The Canadian Grain Commission does not recommend the use of grain protectants. Malathion is more effective in dry grain than in tough or damp grain because the pesticide breaks down rapidly.

Insect	Grain	Liquid mL/1000 kg grain	0.5% Dusts g/1000 kg grain	2.0% Dusts
Grain beetles (flat, rusty, saw-toothed); grain mites; lesser grain borers; flour beetles (confused, red); weevils (granary, rice); Indian meal moth.	Barley	12	2000	520
	Corn	10	—	—
	Oats	17	3000	735
	Rye	10	1750	450
	Wheat	10	1750	415
Indian meal moth	Barley, corn, oats, rye, wheat	300 mL/100 m^2 of grain surface	—	—

Water volume: 10 - 20 L water; Indian meal moth (surface treatment) 5 - 10 L water.

Incorporation: Add to grain as it is being augered, or scatter proper amount of dust on each load and cut in with shovel before dumping.

Malathion/Fyfanon 50% EC (cont'd)

Nozzles: Flat fan recommended.

7. **Application Tips:**

   All crops: Apply when day temperature is expected to exceed 20°C. Do not apply to plants in bloom.

   Stored grain: To protect from Indian meal moth, spray evenly over the surface of uninfested grain and rake to a depth of 15 cm. Where special application equipment is not available, any type of low pressure sprayer holding 5 L or more can be used. Apply spray to the grain stream as it is being elevated into storage. Test sprayer calibration by discharging into a tank of water, then regulate flow of grain to get the proper rate of spray. Keep spray coarse to avoid loss as "drift."

   Before storing new grain: Thoroughly clean up old grain and debris from bins, elevators or grain handling equipment. Remove and burn all sweepings. After cleaning the premises, apply a residual malathion spray to walls, floors and machinery in grain elevators or farm storage, using 200 mL Grain Protectant/5 L water. Force spray into cracks and crevices. Apply at 5 L of spray/100 m^2 of surface area using a coarse wetting spray. Wait until spray has thoroughly dried before storing grain in treated areas. Spray this mixture around the outside of bins and elevators to help prevent the insects from entering the bins.

8. **How it Works:** A non-systemic, contact, organophosphate insecticide and acaricide of brief to moderate persistence. Generally non-phytotoxic. Do not apply foliar sprays at temperatures below 20°C.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest and pre-grazing intervals (days): canola (7), cereals (7), flax (7), hay (7), legumes (7), mustard (7), pastures (0), potatoes (3).

   Forages and pasture: Remove cattle before spraying; cattle may be returned immediately after spraying.

   Stored grain sales: Do not apply within 7 days of selling grain. Do not apply to barley destined for malting.

10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (2,800). Highly toxic to bees and fish.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Headache, weakness, sweating, giddiness, blurred vision, nausea, abdominal cramps, diarrhea and discomfort in chest.

    Notes to physician: It is a cholinesterase inhibitor. Atropinise slowly to avoid cardiac arrest. Do not give respiratory depressants.

    Decontamination: Malathion breaks down rapidly in the presence of water and alkaline materials. Containers and spillages can be readily decontaminated by using Javex, lye or washing soaps that contain sodium hydroxide.

12. **Storage: Flammable.** Do not store near food or feed. Keep container tightly sealed when not being used.

Matador 120EC *(cyhalothrin-lambda)*

Manufacturer **Zeneca Agro**

DANGER POISON

1. **Formulations:** Emulsifiable Concentrate; 120 g/L; 3.78 L jug.
2. **Registered Mixes:** None.
3. **Crops:** Alfalfa, canola, corn (sweet, grain, pop), mustard, wheat, barley, oats, flax, unimproved pasture, summerfallow, potatoes, sunflowers.

4. **Insects Controlled:** Crucifer flea beetle, grasshoppers, sunflower beetle, Colorado potato beetle, tarnished plant bug, leafhopper, tuber flea beetle, alfalfa weevil, lygus bug, pea aphid, potato leaf hopper, European corn borer, corn cutworm, fall wringworm, cutworm.

5. **When Used:** When economic damage is apparent.

   Grasshoppers: Best results on young, non-flying grasshoppers (up to 3rd nymphal stage, up to 1 cm in length) or when insect numbers are low. Use higher rate when grasshopper are larger, up to but not including winged adults (up to 2.5 cm in length) or when insect numbers are high. If insect migration into a field is severe, apply a spray to a 15 m strip around the field.

   Crucifer flea beetle: To prevent migration of overwintering flea beetle adults throughout the field, ground spray a 15 m strip around the field at the first sign of flea beetle feeding.

   Colorado potato beetle: Apply when insects or damage appears. Use the high rate once larvae are past the second instar. Timing of applications should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Colorado potato beetle susceptibility to pyrethroid insecticides should be confirmed using an appropriate assay.

6. **How to Apply:**

   Ground equipment: All registered crops. Do not apply within 15 m of productive fisheries water or waterfowl habitat.

   Aircraft: Do not apply by aircraft.

   Rate: Use a higher rate for severe infestations, when foliage is dense or when grasshoppers are in the late nymphal or adult stage.

[illegible]	[illegible]	[illegible]
Alfalfa	Alfalfa weevil, lygus bug, pea aphid	34
Canola	Crucifer flea beetle, lygus bug	34 - 35
	Grasshoppers	26 - 34
Corn (sweet, grain, pop)	Corn egrworm, European corn borer, fall armyworm, cutworm	34
Wheat, barley, oats, flax, summerfallow, unimproved pasture	Grasshoppers	26 - 34
Potatoes	Colorado potato beetle	34 - 51
	Potato flea beetle, potato leafhopper, tarnished plant bug, tuber flea beetle	34
Sunflowers	Sunflower beetle	17 - 26

   Water volume: Use sufficient water for thorough coverage, 100 to 200 L/ha (40 to 80 L/ac).

7. **Application Tips:** Control of some insects species with synthetic pyrethroid insecticides decreases as temperature rises. For best results, apply Matador 120EC during early morning before temperature rise, and during the evening, past the heat of the day. Rate for control of Colorado potato beetles is governed by larval instar.

8. **How it Works:** Cyhalothrin-lambda is a photostable, synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide effective against a broad spectrum of foliar pests. It has no fumigant or systemic activity. Best result will be obtained with Matador 120EC when applied against the early developmental stages of the pest as determined by regular monitoring.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): Canola and flax (50), wheat, barley and oats (28), potatoes (7), sunflowers (70). Do not allow livestock to forage treated fields within 14 days of application. Do not graze or feed lactating dairy animals on treated green cereal forage or treated pasture. Do not use more than 2 applications of the high rate on potatoes or 3 applications per year in all other situations.

4. **Insects Controlled:** Crucifer flea beetle, grasshoppers, sunflower beetle, Colorado potato beetle, tarnished plant bug, leafhopper, tuber flea beetle, alfalfa weevil, lygus bug, pea aphid, potato leaf hopper, European corn borer, corn cutworm, fall wringworm, cutworm.

5. **When Used:** When economic damage is apparent.

   Grasshoppers: Best results on young, non-flying grasshoppers (up to 3rd nymphal stage, up to 1 cm in length) or when insect numbers are low. Use higher rate when grasshopper are larger, up to but not including winged adults (up to 2.5 cm in length) or when insect numbers are high. If insect migration into a field is severe, apply a spray to a 15 m strip around the field.

   Crucifer flea beetle: To prevent migration of overwintering flea beetle adults throughout the field, ground spray a 15 m strip around the field at the first sign of flea beetle feeding.

   Colorado potato beetle: Apply when insects or damage appears. Use the high rate once larvae are past the second instar. Timing of applications should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Colorado potato beetle susceptibility to pyrethroid insecticides should be confirmed using an appropriate assay.

6. **How to Apply:**

   Ground equipment: All registered crops. Do not apply within 15 m of productive fisheries water or waterfowl habitat.

   Aircraft: Do not apply by aircraft.

   Rate: Use a higher rate for severe infestations, when foliage is dense or when grasshoppers are in the late nymphal or adult stage.

Crop	Insect	Matador 120EC mL/ac
Alfalfa	Alfalfa weevil, lygus bug, pea aphid	34
Canola	Crucifer flea beetle, lygus bug	34 - 35
	Grasshoppers	26 - 34
Corn (sweet, grain, pop)	Corn egrworm, European corn borer, fall armyworm, cutworm	34
Wheat, barley, oats, flax, summerfallow, unimproved pasture	Grasshoppers	26 - 34
Potatoes	Colorado potato beetle	34 - 51
	Potato flea beetle, potato leafhopper, tarnished plant bug, tuber flea beetle	34
Sunflowers	Sunflower beetle	17 - 26

   Water volume: Use sufficient water for thorough coverage, 100 to 200 L/ha (40 to 80 L/ac).

7. **Application Tips:** Control of some insects species with synthetic pyrethroid insecticides decreases as temperature rises. For best results, apply Matador 120EC during early morning before temperature rise, and during the evening, past the heat of the day. Rate for control of Colorado potato beetles is governed by larval instar.

8. **How it Works:** Cyhalothrin-lambda is a photostable, synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide effective against a broad spectrum of foliar pests. It has no fumigant or systemic activity. Best result will be obtained with Matador 120EC when applied against the early developmental stages of the pest as determined by regular monitoring.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): Canola and flax (50), wheat, barley and oats (28), potatoes (7), sunflowers (70). Do not allow livestock to forage treated fields within 14 days of application. Do not graze or feed lactating dairy animals on treated green cereal forage or treated pasture. Do not use more than 2 applications of the high rate on potatoes or 3 applications per year in all other situations.

Matador 120EC (cont'd)

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (female rats) (mg/kg) of Matador 120 = 278; technical = 56. Skin and eye irritant. Very toxic to fish and other aquatic organisms. This product is toxic to bees and other beneficial insects. Avoid spraying when bees are foraging. Do not re-enter treated areas until 24 hours after treatment. If early re-entry into treated areas is required, workers must wear long pants, long sleeved shirts, chemical resistant gloves, boots and a hat.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Avoid splashing into eyes or on skin, particularly the face. If hands are contaminated, wash with soap and water before touching other areas of skin. When applying this product workers should wear long pants, long sleeved shirts and chemical resistant boots. In addition, during mixing, loading, clean-up and repair activities workers must also wear chemical resistant gloves safety goggle and a face shield (see page 29 for further information). Avoid touching face with contaminated gloves and clothing. Wash gloves before removal. Wash protective equipment with soap and water after each use. For directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention for eyes. **If swallowed**, do not induce vomiting. Get medical attention or call Poison Control Center immediately.
12. **Storage:** Store in a cool well ventilated area away from food or feed and out of the reach of children and animals. Store above 0°C. Storage below 0°C will not impair the effectiveness of Matador 120EC, however following such storage, agitate well before use.

Monitor *(methamidophos)*

Manufacturer: Bayer/United Agri Products

DANGER POISON

1. **Formulations:** Liquid: 480 g/L; 10 L pail.
2. **Registered Mixes:** Compatible with most commonly used fungicides.
3. **Crops:** Canola, potatoes.
4. **Insects Controlled:**

aphids
Bertha armyworm
Colorado potato beetle
grasshoppers
potato flea beetle
potato leafhopper

5. **When Used:**

Canola: Bertha armyworm: when larvae number 20 or more /m^2 and are feeding on pods or flowers; maximum 2 applications per season.

Grasshoppers: When grasshoppers reach economic thresholds and cause economic damage; maximum 2 applications per season.

Potatoes: Apply in a 10 - 14 day program when necessary.

6. **How to Apply:**

With: Aircraft or ground equipment.

Rate: Higher rate for severe infestations, adult insects or dense foliage.

Crop	Insect	ml/ac
Canola	Bertha armyworm	230 - 500
	Grasshoppers	500
Potato	Aphids, Colorado potato beetle, potato flea beetle, potato leafhopper	710 - 910

Water volume: Air (canola): 4 L/ac minimum. Ground: 80 - 400 L/ac.

Nozzles: Flat fan recommended.

7. **Application Tips:** Avoid use during flowering and pollination periods.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (female rats) (mg/kg) of Matador 120 = 278; technical = 56. Skin and eye irritant. Very toxic to fish and other aquatic organisms. This product is toxic to bees and other beneficial insects. Avoid spraying when bees are foraging. Do not re-enter treated areas until 24 hours after treatment. If early re-entry into treated areas is required, workers must wear long pants, long sleeved shirts, chemical resistant gloves, boots and a hat.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Avoid splashing into eyes or on skin, particularly the face. If hands are contaminated, wash with soap and water before touching other areas of skin. When applying this product workers should wear long pants, long sleeved shirts and chemical resistant boots. In addition, during mixing, loading, clean-up and repair activities workers must also wear chemical resistant gloves safety goggle and a face shield (see page 29 for further information). Avoid touching face with contaminated gloves and clothing. Wash gloves before removal. Wash protective equipment with soap and water after each use. For directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention for eyes. **If swallowed**, do not induce vomiting. Get medical attention or call Poison Control Center immediately.
12. **Storage:** Store in a cool well ventilated area away from food or feed and out of the reach of children and animals. Store above 0°C. Storage below 0°C will not impair the effectiveness of Matador 120EC, however following such storage, agitate well before use.

Monitor *(methamidophos)*

Manufacturer: Bayer/United Agri Products

DANGER POISON

1. **Formulations:** Liquid; 480 g/L; 10 L pail.
2. **Registered Mixes:** Compatible with most commonly used fungicides.
3. **Crops:** Canola, potatoes.
4. **Insects Controlled:**

aphids
Bertha armyworm
Colorado potato beetle
grasshoppers
potato flea beetle
potato leafhopper

5. **When Used:**

Canola: Bertha armyworm: when larvae number 20 or more /m^2 and are feeding on pods or flowers; maximum 2 applications per season.

Grasshoppers: When grasshoppers reach economic thresholds and cause economic damage; maximum 2 applications per season.

Potatoes: Apply in a 10 - 14 day program when necessary.

6. **How to Apply:**

With: Aircraft or ground equipment.

Rate: Higher rate for severe infestations, adult insects or dense foliage.

[illegible]	[illegible]	[illegible]
Canola	Bertha armyworm	230 - 500
	Grasshoppers	500
Potato	Aphids, Colorado potato beetle, potato flea beetle, potato leafhopper	710 - 910

Water volume: Air (canola): 4 L/ac minimum. Ground: 80 - 400 L/ac.

Nozzles: Flat fan recommended.

7. **Application Tips:** Avoid use during flowering and pollination periods.

8. **How it Works:** Methamidophos is a broad spectrum, organophosphorus insecticide and acaricide that works by contact and systemic action. Non-phytotoxic when used as directed. Contact effectiveness may persist for 7 - 21 days.
9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): canola (10), potatoes (14).
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = 95% technical (13 - 15), Monitor (17 - 20). Extremely toxic to wildlife. Highly toxic to bees exposed to direct treatment or residues on crops. Can cause burns to both skin and eyes.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Tightness in the chest, sweating, contracted pupils, stomach pains, vomiting and diarrhea.

    First aid: In case of poisoning, get medical attention immediately. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    For physician: Antidote is atropine sulphate administered in large therapeutic doses, repeated as necessary to the point of tolerance. 2-PAM is also antidotal and may be administered in conjunction with atropine. Do **not** give morphine.
12. **Storage:** Store and display apart from food or feed. Do not store in or around the home. Store in a cool, dry place but not below -10°C. Protect from heat.

Orthene 75% *(acephate)*

Manufacturer: **Tomen Corporation (Distributor: United Agri Products)**

1. **Formulations:** Soluble powder 75%.
2. **Registered Mixes:** None.
3. **Crops:** Corn (field and sweet), potato.
4. **Insects Controlled:**

    Colorado potato beetle
    European corn borer
    green peach aphid
    potato aphid
    potato flea beetle
    potato leafhopper
    tarnished plant bug

    Insects suppressed: Not applicable.
5. **When Used:** Begin treatment when eggs or insects first appear.
6. **How to Apply:**

    With: Ground equipment. Do not apply by air.

Orthene 75% (cont'd)

Rate:

[illegible]	[illegible]	[illegible]
Corn (field and sweet)	European corn borer	300 - 440
Potato	Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug	300 - 440

Water volume: Corn: 90 - 400 L/ac; Potatoes: 90 - 660 L/ac.

7. **Application Tips:** Do not apply more than four times per season.
8. **How it Works:** Systemic Insecticide. Stomach poison.
9. **Grazing, Cropping and Other Restrictions:** Preharvest intervals depend on the crop. Do not feed trimmings to livestock or allow animals to graze on treated areas. Do not feed corn fodder or forage from treated crop to livestock. Pre-harvest interval (days): corn (21); potatoes (21).
10. **Toxicity:** Toxic. Acute oral LD_{50} (rats)(mg/kg) 605 - 1100. Toxic to fish and wildlife. Highly toxic to bees.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **Keep out of reach of children.**
    Orthene is a cholinesterase inhibitor. **Atropine is the antidote. 2-PAM may also be used in conjunction with atropine but should not be used alone.**
12. **Storage:** Store in cool, dry place. Protect from excessive heat.

Sevin *(carbaryl)*

Manufacturer: **Aventis Crop Science**

WARNING POISON

1. **Formulations:** Liquid Suspensions; XLR-Plus; 480 g/L; 10 L jug. Wettable Powder; 50W; 50%; 2 kg bag. Sprayable Powder; 80S; 80%; 4.5 kg bag.
2. **Registered Mixes:** Most formulations are compatible with a wide range of pesticides. Do **not** apply mixes if they are physically incompatible (e.g.,curdle or precipitate). Liquid formulations are **not** compatible with diesel fuel, kerosene, fuel oil, aromatic solvents or any Stampede formulation. All formulations are unstable when mixed with alkaline materials such as Bordeaux mixture, lime-sulphur and casein-lime spreaders.

    Mixing instructions: Prepare only the required amount of spray on the day of application. Do not store spray mixtures overnight. Agitate, stir or recirculate all carbaryl sprays prior to use.
3. **Crops:**

alfalfa
barley
canola
clover
corn (field, sweet)
forage grasses
non-crop areas
oats
pastures
potato
rangelands
rye
wheat

4. **Insects Controlled:**
   - alfalfa caterpillar
   - alfalfa weevil larvae
   - armyworm
   - blister beetles
   - Colorado potato beetle
   - corn earworm
   - European corn borer
   - fall armyworm
   - flea beetles
   - grasshoppers
   - leafhoppers
   - potato flea beetle
   - stink bug
   - sweet clover weevil
   - tarnished plant bug
   - webworm
5. **When Used:** Apply when necessary to prevent economic damage. Do not apply when crops are in bloom.
6. **How to Apply:**

With: Aircraft or ground equipment. Clean lines and tank after spraying.

Rate: Lower rate on immature insects, light infestations or sparse foliage. Higher rate for adult insects, severe infestations or dense foliage.

Crop	Insect	XLR-Plus L/ac	50 W kg/ac	80 S kg/ac
Canola (seedlings only, up to 4 weeks after emergence)	Flea beetles	0.2	—	0.3
	Grasshoppers: nymph	0.50 - 1.0		
	adult	1.0 - 1.4		
Barley, oats, rye, wheat	Grasshoppers: nymph	0.5 - 1.0	0.45 - 0.9	0.3 - 0.6
	adult	1.0 - 1.4		
Alfalfa, clover	Alfalfa caterpillar, armyworm, webworm	1.0 - 2.1	0.9 - 1.8	0.7 - 0.9
	Alfalfa weevil larvae	—	1.3	0.9
	Blister beetle	1.0 - 1.6	0.9 - 1.3	0.6 - 0.7
	Climbing cutworm	—	0.9 - 1.8	0.6 - 1.2
	Leafhoppers	1.0 - 1.6	0.9 - 1.3	0.6 - 0.7
Corn (field, sweet)	Corn earworm, European corn borer, fall armyworm	1.0 - 1.6	0.9 - 1.3	0.6 - 0.9
	Grasshoppers: nymph	0.5 - 1.0	—	—
	adult	1.0 - 1.4	—	—
Potato	Colorado potato beetle	0.5	0.45	—
	Leafhoppers	0.5	0.9	0.6
	Potato flea beetle	0.5	0.9	0.3 - 0.6
Forage grasses, pastures, rangeland, non-crop areas.	Grasshoppers (nymphs or sparse vegetation)	0.5 - 1.0	—	—
	Grasshoppers (adults or dense vegetation)	1.0 - 1.4	—	—

Water volume: Aircraft: 4 L/ac minimum. Ground: 12 L/ac minimum.

XLR-Plus: Dilutions greater than 1:39 will reduce washoff resistance.

50W: Aircraft: 4 - 14 L/ac; Ground: 11 - 14 L/ac. Forages, cereals: 229 L/ac minimum; Potato: 91 - 111 L/ac.

80S: Corn, potatoes: use sufficient water to obtain full coverage; Forages, cereals: 22 - 178 L/ac; Climbing cutworms: 223 L/ac minimum.

All crops: Use sufficient water to obtain thorough and uniform coverage of spray depending on equipment, severity of infestation and stage of crop growth.

Low volume air applications: Hot, dry conditions may cause excessive evaporation of droplets. A higher spray volume per acre may be required under hot, dry conditions and when crop canopies are particularly dense.

Nozzles: Low volume applications:

Orthene 75% (cont'd)

Rate:

Crop	Insect	g/ac
Corn (field and sweet)	European corn borer	300 - 440
Potato	Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug	300 - 440

Water volume: Corn: 90 - 400 L/ac; Potatoes: 90 - 660 L/ac.

7. **Application Tips:** Do not apply more than four times per season.
8. **How it Works:** Systemic Insecticide. Stomach poison.
9. **Grazing, Cropping and Other Restrictions:** Preharvest intervals depend on the crop. Do not feed trimmings to livestock or allow animals to graze on treated areas. Do not feed corn fodder or forage from treated crop to livestock. Pre-harvest interval (days): corn (21); potatoes (21).
10. **Toxicity:** Toxic. Acute oral LD_{50} (rats)(mg/kg) 605 - 1100. Toxic to fish and wildlife. Highly toxic to bees.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. **Keep out of reach of children.**

    Orthene is a cholinesterase inhibitor. **Atropine is the antidote. 2-PAM may also be used in conjunction with atropine but should not be used alone.**
12. **Storage:** Store in cool, dry place. Protect from excessive heat.

Sevin *(carbaryl)*

Manufacturer: **Aventis Crop Science**

WARNING POISON

1. **Formulations:** Liquid Suspensions; XLR-Plus; 480 g/L; 10 L jug. Wettable Powder; 50W; 50%; 2 kg bag. Sprayable Powder; 80S; 80%; 4.5 kg bag.
2. **Registered Mixes:** Most formulations are compatible with a wide range of pesticides. Do **not** apply mixes if they are physically incompatible (e.g.,curdle or precipitate). Liquid formulations are **not** compatible with diesel fuel, kerosene, fuel oil, aromatic solvents or any Stampede formulation. All formulations are unstable when mixed with alkaline materials such as Bordeaux mixture, lime-sulphur and casein-lime spreaders.

    Mixing instructions: Prepare only the required amount of spray on the day of application. Do not store spray mixtures overnight. Agitate, stir or recirculate all carbaryl sprays prior to use.
3. **Crops:**

    alfalfa
    barley
    canola
    clover
    corn (field, sweet)
    forage grasses
    non-crop areas
    oats
    pastures
    potato
    rangelands
    rye
    wheat

4. Insects Controlled:

- alfalfa caterpillar
- alfalfa weevil larvae
- armyworm
- blister beetles
- Colorado potato beetle
- corn earworm
- European corn borer
- fall armyworm
- flea beetles
- grasshoppers
- leafhoppers
- potato flea beetle
- stink bug
- sweet clover weevil
- tarnished plant bug
- webworm

5. When Used: Apply when necessary to prevent economic damage. Do not apply when crops are in bloom.

6. How to Apply:

With: Aircraft or ground equipment. Clean lines and tank after spraying.

Rate: Lower rate on immature insects, light infestations or sparse foliage. Higher rate for adult insects, severe infestations or dense foliage.

Crop	Insect	XLR-Plus L/ac	50 W kg/ac	80 S kg/ac
Canola (seedlings only, up to 4 weeks after emergence)	Flea beetles	0.2	—	0.3
	Grasshoppers: nymph	0.50 - 1.0		
	adult	1.0 - 1.4		
Barley, oats, rye, wheat	Grasshoppers: nymph	0.5 - 1.0	0.45 - 0.9	0.3 - 0.6
	adult	1.0 - 1.4		
Alfalfa, clover	Alfalfa caterpillar, armyworm, webworm	1.0 - 2.1	0.9 - 1.8	0.7 - 0.9
	Alfalfa weevil larvae	—	1.3	0.9
	Blister beetle	1.0 - 1.6	0.9 - 1.3	0.6 - 0.7
	Climbing cutworm	—	0.9 - 1.8	0.6 - 1.2
	Leafhoppers	1.0 - 1.6	0.9 - 1.3	0.6 - 0.7
Corn (field, sweet)	Corn earworm, European corn borer, fall armyworm	1.0 - 1.6	0.9 - 1.3	0.6 - 0.9
	Grasshoppers: nymph	0.5 - 1.0	—	—
	adult	1.0 - 1.4	—	—
Potato	Colorado potato beetle	0.5	0.45	—
	Leafhoppers	0.5	0.9	0.6
	Potato flea beetle	0.5	0.9	0.3 - 0.6
Forage grasses, pastures, rangeland, non-crop areas.	Grasshoppers (nymphs or sparse vegetation)	0.5 - 1.0	—	—
	Grasshoppers (adults or dense vegetation)	1.0 - 1.4	—	—

Water volume: Aircraft: 4 L/ac minimum. Ground: 12 L/ac minimum.

XLR-Plus: Dilutions greater than 1:39 will reduce washoff resistance.

50W: Aircraft: 4 - 14 L/ac; Ground: 11 - 14 L/ac. Forages, cereals: 229 L/ac minimum; Potato: 91 - 111 L/ac.

80S: Corn, potatoes: use sufficient water to obtain full coverage; Forages, cereals: 22 - 178 L/ac; Climbing cutworms: 223 L/ac minimum.

All crops: Use sufficient water to obtain thorough and uniform coverage of spray depending on equipment, severity of infestation and stage of crop growth.

Low volume air applications: Hot, dry conditions may cause excessive evaporation of droplets. A higher spray volume per acre may be required under hot, dry conditions and when crop canopies are particularly dense.

Nozzles: Low volume applications:

Sevin (cont'd)

Wettable powder: 50-mesh or coarser screens in entire system; cone type nozzles, No. 3 or larger.

XLR-Plus: 50-mesh, in-line strainers and 25-mesh, slotted strainers behind the nozzle; cone type nozzles, sizes D6-45 or D8-45.

Note: Flat fan nozzles may be used, but care should be taken as excessive droplet breakup and resulting production of fine droplets may occur. Flat fan nozzles are also prone to plugging under hot, dry conditions.

7. **Application Tips:** Timing and good coverage are essential for effective control. Calibrate spray equipment to deliver the required volume. Agitate, stir or recirculate all carbaryl formulations prior to use.

   Corn: Treat entire plant for larvae in whorls or on foliage. Spray in a 25 - 30 cm band over the row for climbing cutworms. Apply at 2 - 4 day intervals, if necessary, for insects attacking silks and ears; start when first silks appear and continue until silks begin to dry (3 or more applications may be needed).

   Alfalfa weevil: If pre-treatment damage is extensive, cut and make application to stubble.

8. **How it Works:** A carbamate insecticide that works by contact and ingestion. Moderate to rapid in speed of action with moderate to long residual effectiveness (2 days to 4 weeks) depending on crop/pest complex, formulation and climatic conditions.

   Expected results: Some immediate control is expected, but the majority of control occurs 24 - 48 hours after application.

   Effects of rainfall: Do not apply just before rain.

   XLR-Plus: Maximum resistance to wash off is obtained in the range of 1:1 - 1:39 (XLR-Plus:Water) dilution.

   50W/80S: Do not apply to wet foliage or when rain or high humidity is expected within 2 days.

   Movement in soil: None.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest or pre-grazing interval (days): Barley, oats, rye, wheat (14); corn (1); potatoes (7). Alfalfa, clovers, forage grasses, pasture, rangeland, non-crop areas (0). Remove cattle from area to be sprayed. Cattle may graze immediately after application. Treated forage and feed crops may be fed to dairy animals and animals for slaughter provided sprays are applied as directed.

10. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (540). Although carbaryl is toxic to honey bees, Sevin XLR and XLR-Plus have a reduced honey bee hazard warning; do not apply directly to foraging bees.

11. **Precautions, First Aid:** Can be absorbed through the skin. Ensure the residue on the plants is dry before foraging begins. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Salivation, tearing, urination, defecation, pinpoint pupils, muscle spasms, general muscular weakness, nausea, prostration, convulsions.

    For physician: Carbaryl insecticide is a moderate, reversible cholinesterase inhibitor. **Atropine is antidotal.** Do not use 2-PAM opiates or cholinesterase inhibiting drugs.

12. **Storage:** Do not store where temperature frequently exceeds 38°C. All formulations will withstand freezing.

Temik *(aldicarb)*

Manufacturer **Aventis Crop Science**

☠ DANGER POISON

1. **Formulations:** Granular; Temik 10G; 10%; 15 kg bag.

2. **Registered Mixes:** Compatible with most fertilizers and pesticides. Do not use with alkaline materials such as lime.

3. **Crops:** Sugar beets.
4. **Insects Controlled:** Sugar beet root maggot.
5. **When Used:** At planting time. Only 1 application per year.
6. **How to Apply:**

With: ground equipment. Do not use applicators that would grind granules.

Rate:

[illegible]	[illegible]	[illegible]	[illegible]
Sugar beets	Sugar beet root maggot	4.5	100

Incorporation:

Band treatment: At planting, apply granules in a 20 cm wide band and work into the soil or cover with soil to a depth of 10 cm. Plant seed pieces in the treated zone.

7. **Application Tips:** Calibrate and adjust application equipment to ensure proper rate and accurate placement. Do not mix granules directly with water. Deep disc spills at row ends immediately to prevent birds from feeding on exposed granules. Do not apply to crops in bloom. Do not apply to very dry soil unless treatment is followed by irrigation.
8. **How it Works:** Aldicarb is a soil-applied, systemic, carbamate insecticide. Soil moisture is required to release the active chemical from the granules (corn cob grits), so irrigation or rainfall should follow application. Uptake by roots is rapid; residual activity varies with dosage and pests involved but often lasts more than 6 weeks.

Expected results: Active ingredient is rapidly absorbed by root systems and translocated upward throughout all parts of the plant. Residual activity varies with dosage and pests involved but often lasts more than 6 weeks.

Effects of rainfall: See *"Movement in soil."*

Movement in soil: The following environmental conditions, when present and in combination, reduce the rate of degradation of Temik in soil and may allow movement of product residues to ground waters: Cool soil temperatures at time of application (below 10°C in root zone); heavy anticipated seasonal rainfall within 1 month after use; sandy or loamy sand soils and subsoils (field moisture holding capacity less than 15% by volume) with low organic matter (less than 1% in top 30 cm of soil); acidic subsoils (pH less than 6.0); fields that overlie shallow water tables less than 15 m deep. When all of the above conditions are met, do **not** apply. Contact Aventis Crop Science (1-403-253-8471) if there is any question of whether your location meets these conditions.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): sugar beets (90). Do not harvest sugar beet tops for livestock feed within 120 days of application. Do not use tops from treated beets as food for humans. Do not use plant parts for food or feed. Do not plant food crops in soil treated with Temik for at least 1 year after treatment.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (0.9). Toxic to fish, birds, and other wildlife. Birds consuming granules may be killed.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Extreme poisoning may cause death due to respiratory failure.

Symptoms of poisoning: Weakness, headache, sweating, nausea, vomiting, diarrhea, tightness in chest, blurred vision, pinpoint pupils, abnormal flow of saliva, abdominal cramps, unconsciousness.

First aid: Contact a physician immediately in all cases.

For physician: Atropine sulphate is antidotal. Do not use opiates or cholinesterase-inhibiting drugs.

3. **Crops:** Sugar beets.
4. **Insects Controlled:** Sugar beet root maggot.
5. **When Used:** At planting time. Only 1 application per year.
6. **How to Apply:**

With: ground equipment. Do not use applicators that would grind granules.

Rate:

Crop	Insect	kg/ac	g/100 m row
Sugar beets	Sugar beet root maggot	4.5	100

Incorporation:

Band treatment: At planting, apply granules in a 20 cm wide band and work into the soil or cover with soil to a depth of 10 cm. Plant seed pieces in the treated zone.

7. **Application Tips:** Calibrate and adjust application equipment to ensure proper rate and accurate placement. Do not mix granules directly with water. Deep disc spills at row ends immediately to prevent birds from feeding on exposed granules. Do not apply to crops in bloom. Do not apply to very dry soil unless treatment is followed by irrigation.
8. **How it Works:** Aldicarb is a soil-applied, systemic, carbamate insecticide. Soil moisture is required to release the active chemical from the granules (corn cob grits), so irrigation or rainfall should follow application. Uptake by roots is rapid; residual activity varies with dosage and pests involved but often lasts more than 6 weeks.

Expected results: Active ingredient is rapidly absorbed by root systems and translocated upward throughout all parts of the plant. Residual activity varies with dosage and pests involved but often lasts more than 6 weeks.

Effects of rainfall: See "*Movement in soil.*"

Movement in soil: The following environmental conditions, when present and in combination, reduce the rate of degradation of Temik in soil and may allow movement of product residues to ground waters: Cool soil temperatures at time of application (below 10°C in root zone); heavy anticipated seasonal rainfall within 1 month after use; sandy or loamy sand soils and subsoils (field moisture holding capacity less than 15% by volume) with low organic matter (less than 1% in top 30 cm of soil); acidic subsoils (pH less than 6.0); fields that overlie shallow water tables less than 15 m deep. When all of the above conditions are met, do **not** apply. Contact Aventis Crop Science (1-403-253-8471) if there is any question of whether your location meets these conditions.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): sugar beets (90). Do not harvest sugar beet tops for livestock feed within 120 days of application. Do not use tops from treated beets as food for humans. Do not use plant parts for food or feed. Do not plant food crops in soil treated with Temik for at least 1 year after treatment.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (0.9). Toxic to fish, birds, and other wildlife. Birds consuming granules may be killed.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Extreme poisoning may cause death due to respiratory failure.

Symptoms of poisoning: Weakness, headache, sweating, nausea, vomiting, diarrhea, tightness in chest, blurred vision, pinpoint pupils, abnormal flow of saliva, abdominal cramps, unconsciousness.

First aid: Contact a physician immediately in all cases.

For physician: Atropine sulphate is antidotal. Do not use opiates or cholinesterase-inhibiting drugs.

Temik (cont'd)

Decontamination:

Spills on floors: Use a sweeping compound to clean up. Decontaminate the waste with a solution of caustic soda, a strong commercial bleach and detergent. Wash floor with decontamination solution and rinse well with clean water. Clean up solution and rinse water with absorbent material such as sawdust, sweeping compound or rags.

Spills on ground: Treat the affected area with the decontamination solution and cover with clean soil.

Decontamination solution: Into 10 L of water, slowly and carefully add in sequence 130 g detergent, followed by 525 g caustic soda (lye) and finally 1.2 L of commercial bleach (sodium hypochlorite). Handle and use solution with great care. Do **not** add water to dry lye.

12. **Storage:** Do not refrigerate. Highly flammable as a liquid.

Thimet *(phorate)*

Manufacturer: Cyanamid Crop Protection

DANGER POISON

1. **Formulations:** Granular: Thimet 15-G; 15%; 25 kg bag; 20 kg Lock and Load.
2. **Registered Mixes:** None.
3. **Crops:** Beans, potatoes.
4. **Insects Controlled:**

aphids
Colorado potato beetle
leafhopper
lygus bug
thrips

Insects suppressed: Potato flea beetle, wireworm.

5. **When Used:** One application at planting time only.
6. **How to Apply:**

With: Granular pesticide applicator.

Rate:

Crop	Insect	Quantity
Beans	Aphids, leafhopper, lygus bug, thrips	2.93 - 4.45 kg product/acre
Potatoes	Aphids, leafhoppers, reduction of potato flea beetle and wireworm damage, Colorado potato beetle (early season control)	140 g/100 m row (sandy soils) 215 g/100 m row (silt to clay soils)

7. **Application Tips:** Beans: distribute in the row to the side of the seed. Potatoes: distribute evenly in the furrow on each side of the row. Do not place in direct contact with the seed. Do not use in muck soils. Do not apply to any area not specified on the label. Do not apply later than at planting time of potatoes and beans.
8. **How it Works:** A systemic, organophosphorus insecticide with effective initial residual activity against soil insects and other arthropods.

Expected results: Only early season control of Colorado potato beetle. Reduction of potato flea beetle and wireworm damage.

Effects of rainfall: Relatively insoluble in water, therefore, the effect of normal rainfall is not appreciable.

Movement in soil: Relatively insoluble, therefore, movement is not appreciable.

9. **Grazing, Cropping and Other Restrictions:** Do not feed foliage of treated beans within 60 days of treatment.

Temik (cont'd)

Decontamination:

Spills on floors: Use a sweeping compound to clean up. Decontaminate the waste with a solution of caustic soda, a strong commercial bleach and detergent. Wash floor with decontamination solution and rinse well with clean water. Clean up solution and rinse water with absorbent material such as sawdust, sweeping compound or rags.

Spills on ground: Treat the affected area with the decontamination solution and cover with clean soil.

Decontamination solution: Into 10 L of water, slowly and carefully add in sequence 130 g detergent, followed by 525 g caustic soda (lye) and finally 1.2 L of commercial bleach (sodium hypochlorite). Handle and use solution with great care. Do **not** add water to dry lye.

12. **Storage:** Do not refrigerate. Highly flammable as a liquid.

Thimet *(phorate)*

Manufacturer: **Cyanamid Crop Protection**

DANGER POISON

1. **Formulations:** Granular; Thimet 15-G; 15%; 25 kg bag; 20 kg Lock and Load.
2. **Registered Mixes:** None.
3. **Crops:** Beans, potatoes.
4. **Insects Controlled:**

aphids
Colorado potato beetle
leafhopper
lygus bug
thrips

Insects suppressed: Potato flea beetle, wireworm.

5. **When Used:** One application at planting time only.
6. **How to Apply:**

With: Granular pesticide applicator.

Rate:

Crop	Insect	Quantity
Beans	Aphids, leafhopper, lygus bug, thrips	2.93 - 4.45 kg product/acre
Potatoes	Aphids, leafhoppers, reduction of potato flea beetle and wireworm damage, Colorado potato beetle (early season control)	140 g/100 m row (sandy soils) 215 g/100 m row (silt to clay soils)

7. **Application Tips:** Beans: distribute in the row to the side of the seed. Potatoes: distribute evenly in the furrow on each side of the row. Do not place in direct contact with the seed. Do not use in muck soils. Do not apply to any area not specified on the label. Do not apply later than at planting time of potatoes and beans.
8. **How it Works:** A systemic, organophosphorus insecticide with effective initial residual activity against soil insects and other arthropods.

Expected results: Only early season control of Colorado potato beetle. Reduction of potato flea beetle and wireworm damage.

Effects of rainfall: Relatively insoluble in water, therefore, the effect of normal rainfall is not appreciable.

Movement in soil: Relatively insoluble, therefore, movement is not appreciable.

9. **Grazing, Cropping and Other Restrictions:** Do not feed foliage of treated beans within 60 days of treatment.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (2 - 4). Acute dermal LD_{50} rabbits (mg/kg) = (226). Highly toxic to fish, birds and other animals. Birds consuming granules may be killed. Poisonous by skin contact, inhalation or swallowing. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning.

11. **Precautions, First Aid:**

Protective equipment: Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Keep out of reach of children and animals. Pour downwind and allow as little free fall as possible.

Symptoms of poisoning: Weakness, headache, tightness of chest, blurred vision, nonreactive pinpoint pupils, salivation, sweating, nausea, vomiting, diarrhea and abdominal cramps.

First aid: Call a physician at once in case of suspected poisoning. In emergency endangering life or property, call collect day or night 613-996-6666. **Antidote is atropine. If inhaled**, remove victim to fresh air. If victim is not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen. **If in eyes or on skin**, use standard first aid measures. Remove contaminated clothing and shoes. **If swallowed**, seek medical attention.

For physician: Give atropine intramuscularly or intravenously depending on severity of poisoning, 2 - 4 mg every 10 minutes until fully atropinized. 20 - 30 mg or more may be required during the first 24 hours. Never give opiates or phenothiazine tranquillizers or other depressants. Clear chest by postural drainage. Artificial respiration or oxygen administration may be necessary. Observe patient continously for at least 48 hours. Repeated exposure to cholinesterase inhibitors may, without warning, cause increasing susceptibility to very small doses of any cholinesterase inhibitor. Allow no further exposure to any cholinesterase inhibitor until cholinesterase regeneration has taken place. Pralidoxime chloride (2-PAM: Protopam chloride) may be effective as an adjunct to atropine. Use according to label directions.

Decontamination:

Procedure for decontamination of surfaces: Keep unprotected persons out of the contaminated area.

Protective equipment: Hat, overalls, rubber apron, rubber boots and rubber gloves. **Do not allow** product to contact eyes and skin. Launder clothing and clean protective equipment after use.

Warning: Avoid smoking, open flames and sparks in the operating area as the decontamination procedure involves use of alcohols.

Cover spilled granules with an absorbent material such as sweeping compound to minimize dust. Sweep up granules and place in a tightly closed, labelled container. Store in a secure place. Contact Cyanamid Canada Inc. or federal authorities for details on how to detoxify product. Granules that remain in a broken bag should be transferred to a clearly marked, tightly closed alternate container. Dispose of material in accordance with provincial requirements. Wash surface with a bleach decontamination solution prepared by mixing 9 L water with 1 L commercial bleach and 0.5 L rubbing alcohol. Rinse with clean water. Clean up the liquid with absorbent material such as sawdust, sweeping compound or other materials. Repeat washing with bleach solution and water until liquid is cleaned up. Dispose of contaminated absorbent material in accordance with provincial requirements. Wash disposal equipment with bleach solution and rinse with clean water. If spill occurs on the ground, collect material and dispose as directed. Treat affected area with the decontamination solution and cover with clean soil.

12. **Storage:** Do not use or store in or around the home. Must be stored or displayed **away** from food and feed. Store open bags in labelled, sealed drums or heavy plastic bags.

Thiodan/Endosulfan 400/ Thionex EC/Endosulfan 50W

(endosulfan)

Manufacturer: **Aventis Crop Science/United Agri Products**

DANGER POISON

1. **Formulations:** Emulsifiable Concentrate; 400 g/L; 10 L container. Wettable Powder; 50%; 2 kg bag.

2. **Registered Mixes:** Endosulfan is compatible with most insecticides and fungicides except Bordeaux mixture, hydrated lime, calcium arsenate or zinc sulphate.

   Mixing instructions: Wettable powder: fill spray tank nearly full and either pour recommended amount on water surface or pre-mix powder in a bucket 1/2 filled with water, then pour mix through screen into nearly filled spray tank. Finish filling tank. Keep agitator running during filling and spraying.

3. **Crops:**

   alfalfa
   beans (except lima)
   clover
   corn (field, sweet)
   peas (canning, seed)
   potatoes
   sugar beets
   sunflowers

4. **Insects Controlled:**

   aphids
   beet webworm
   black bean aphid
   Colorado potato beetle
   corn earworm
   corn leaf aphid
   green peach aphid
   leafhoppers
   pea aphid
   pea weevil
   potato aphid
   potato flea beetle
   potato leafhopper
   spittle bug
   sunflower beetle
   tarnished plant bug
   tuber flea beetle

5. **When Used:** Repeat as necessary unless directed otherwise.

   Alfalfa, clover: Apply soon after spittle bug eggs hatch. Do not apply when bees are present.

   Corn, peas: Do not apply more than twice per season. Apply to peas only if crop is to be harvested by combine.

   Sugar beets, sunflowers: Do not apply more than once per season.

   Sunflower beetle: Economic threshold – 1 - 2 adults/seedling or 10 - 15 larvae/plant causing 25% defoliation on the upper 8 - 12 leaves.

6. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate: Lower rate for young insects (larvae), light infestations or sparse foliage.

Crop	Insect	EC/WP	Qty/ac	Crop	Insect	EC/WP	Qty/ac
Alfalfa, clover	Spittle bugs	EC	0.3 L/ac	Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid, tuber flea beetle	EC WP	0.6 L/ac 445 g/ac
Beans (except lima)	Black bean aphid, potato leafhopper	EC WP	0.6 L/ac 445 - 605 g/ac		Tarnished plant bug	EC WP	0.8 L/ac 605 - 710 g/ac
Corn (field, sweet)	Corn earworm	EC	1.1 - 1.7 L/ac	Sugar beets	Beet webworm	EC	1.1 L/ac
	Corn leaf aphid	EC	1.1 L/ac		Green peach aphid	EC	0.8 L/ac
Peas (canning)	Pea aphid, pea weevil	EC WP	0.6 - 0.8 L/ac 445 - 710 g/ac	Sunflower	Sunflower beetle	EC	0.6 L/ac

Water volume: Thorough wetting of all plant parts is essential for good results.

Nozzles: Flat fan recommended.

Thiodan/Endosulfan 400/ Thionex EC/Endosulfan 50W

(endosulfan)

Manufacturer **Aventis Crop Science/United Agri Products**

DANGER POISON

1. **Formulations:** Emulsifiable Concentrate; 400 g/L; 10 L container. Wettable Powder; 50%; 2 kg bag.
2. **Registered Mixes:** Endosulfan is compatible with most insecticides and fungicides except Bordeaux mixture, hydrated lime, calcium arsenate or zinc sulphate.

   Mixing instructions: Wettable powder: fill spray tank nearly full and either pour recommended amount on water surface or pre-mix powder in a bucket 1/2 filled with water, then pour mix through screen into nearly filled spray tank. Finish filling tank. Keep agitator running during filling and spraying.
3. **Crops:**

alfalfa
beans (except lima)
clover
corn (field, sweet)
peas (canning, seed)
potatoes
sugar beets
sunflowers

4. **Insects Controlled:**

aphids
beet webworm
black bean aphid
Colorado potato beetle
corn earworm
corn leaf aphid
green peach aphid
leafhoppers
pea aphid
pea weevil
potato aphid
potato flea beetle
potato leafhopper
spittle bug
sunflower beetle
tarnished plant bug
tuber flea beetle

5. **When Used:** Repeat as necessary unless directed otherwise.

   Alfalfa, clover: Apply soon after spittle bug eggs hatch. Do not apply when bees are present.

   Corn, peas: Do not apply more than twice per season. Apply to peas only if crop is to be harvested by combine.

   Sugar beets, sunflowers: Do not apply more than once per season.

   Sunflower beetle: Economic threshold – 1 - 2 adults/seedling or 10 - 15 larvae/plant causing 25% defoliation on the upper 8 - 12 leaves.
6. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate: Lower rate for young insects (larvae), light infestations or sparse foliage.

Crop	Insect	EC/WP	Dosage	Crop	Insect	EC/WP	Dosage
Alfalfa, clover	Spittle bugs	EC	0.3 L/ac	Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid, tuber flea beetle	EC WP	0.6 L/ac 445 g/ac
Beans (except lima)	Black bean aphid, potato leafhopper	EC WP	0.6 L/ac 445 - 605 g/ac		Tarnished plant bug	EC WP	0.8 L/ac 605 - 710 g/ac
Corn (field, sweet)	Corn earworm	EC	1.1 - 1.7 L/ac	Sugar beets	Beet webworm	EC	1.1 L/ac
	Corn leaf aphid	EC	1.1 L/ac		Green peach aphid	EC	0.8 L/ac
Peas (canning)	Pea aphid, pea weevil	EC WP	0.6 - 0.8 L/ac 445 - 710 g/ac	Sunflower	Sunflower beetle	EC	0.6 L/ac

Water volume: Thorough wetting of all plant parts is essential for good results.

Nozzles: Flat fan recommended.

7. **Application Tips:** Apply during late evening. Spray upper and lower leaf surfaces. Prevent sprays or dusts from drifting to areas occupied by people or animals.

8. **How it Works:** A non-systemic, organochloride insecticide/acaricide with both contact and stomach action.

9. **Grazing, Cropping and Other Restrictions:** Pre-harvest intervals (days): alfalfa, clover (30); beans (2); corn (50); peas (7); potatoes (0); sugar beets (45); sunflower (60). Do not feed treated crop refuse (vines, tops, stalks, threshings, sugar beet or sunflower foliage) to livestock. Sugar beet roots and cull potatoes may be fed. Do not ensile treated corn. Do not feed fresh, dry or ensiled vines and pods of treated peas to livestock. Do not graze treated green crops except for alfalfa and clover, which should not be foraged within 30 days of application.

   Succeeding crops: Do not apply to crops that are to be followed by a root crop other than carrots, potatoes, sweet potatoes or sugar beets.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (80 - 110). Toxic to bees. Highly toxic to fish. Moderately toxic to birds and mammals.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Nausea, headache, general feeling of being unwell, followed by generalized convulsion.

    Decontamination:

    Spilled powder: Cover with sawdust or dirt to prevent scattering. Apply sodium carbonate, caustic soda or hydrated lime on contaminated area. After 1 hour, collect and wash paved areas with water.

    Spilled liquid: Decontaminate with any of above alkaline chemicals and allow to stand for 1 hour. Apply sawdust, talc or sand to absorb all liquid. Decontaminate tools with hydrated lime. Dispose of waste in accordance with provincial requirements.

    Notes to physician: Do not give stimulants. Epinephrine or equedrine may cause ventricular fibrillation. Use an anticonvulsant.

12. **Storage:** Do not store E.C. below -7°C.

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Chemical Control of Plant Diseases in Alberta

Introduction

Plants, like other living organisms, are attacked by many diseases that are caused by fungi, bacteria, viruses, mycoplasmas and nematodes. The management of plant diseases is based on four general parameters that include:

a) **Exclusion** or quarantine, i.e., prevention of a disease organism or diseased plant material from entering a country or disease-free area where the disease could become established;
b) **Protection** whereby proper sanitation practices, chemical controls, adequate soil nutrient levels and good soil drainage may be used to protect plants from disease organisms;
c) **Eradication** involving the use of crop rotations or the application of eradicant chemicals such as fungicides; and
d) **Plant breeding** whereby crop plants are selected for partial or complete resistance to a specific disease or range of infectious diseases.

Chemical control of disease

In Alberta, fungal diseases of some field crops may be subject to direct chemical control by fungicides. Control of most other field crop diseases relies on alternate methods. The major use of fungicides in these crops, at present, is in the treatment of seeds (cereal, forage, oilseed) and potato seed pieces. This situation may change in the near future as grain growers move to adopt more intensive crop management strategies in an attempt to increase profit margins.

At present, foliar fungicides are registered for sclerotinia white mold and blackleg control in canola, cereal leaf diseases, field beans, lentils and foliar diseases of potatoes. For convenience, dual purpose treatments with the insecticide lindane and diazinon, used in seed-treatment formulations, have been included in this chapter on fungicides. For principles and procedures involving the use of plant disease control chemicals, follow the information outlined in the first section of this guide.

Seed Treatment of Cereal, Forage, Oilseed and Pulse Crops

Purpose of Seed Treatment

Seed treatment provides economical insurance against many diseases and some insect pests of seed and seedlings. Chemical treatment can give seedlings a head start by preventing or reducing damage resulting from certain crop pests.

Diseases are controlled by contact fungicides that destroy fungi carried on the seed, such as common bunt of wheat, the surface-borne smuts of barley and oats, fungus stripe of barley, and some leaf-spotting and seed decay fungi. Systemic fungicides destroy fungi carried in the seed, such as loose smut of wheat and barley and protect the early growth of the seedling.

It is specifically recommended that:

- Rye and flax should be treated because they are very susceptible to seed decay.
- Winter wheat should be treated to prevent bunt, seed decay and to promote good seedling growth.
- If bunt or smut was observed in a crop that will be used for seed, the grain should be treated. If a variety is grown that is susceptible to bunt or smut and the presence of the disease is uncertain, it may be wise to treat the seed annually or every second year, depending on the susceptibility of the variety.
- Canola should always be treated to control the seed-borne phase of blackleg.
- Alfalfa seed is treated to control verticillium wilt.

Insecticidal seed treatment will prevent or reduce damage caused by certain crop pests.

- Crops on newly broken land or cereals on fields with previous wireworm damage should be treated with an insecticide formulation. For a lasting effect, the treatment should be done over two consecutive years.
- Canola and mustard are protected against flea beetles by lindane formulations. Granular insecticides offer extended protection.

Methods of seed treatment

Custom Treatment

Fungicides are applied to the seed sometime before planting. Seed cleaning plants are equipped to treat seed with liquid fungicides. Farmers can use a variety of methods for both liquid and dry formulation application.

Drill Box Treatment

Seed is treated directly in the drill box. Fungicides and seed are layered and then mixed thoroughly. This technique avoids the problem of storing treated seed or treating more seed than necessary for planting. Use protective gloves, clothing and breathing equipment for this operation.

Precautions

- **read** and **follow** label directions carefully.
- **treated** seed must not be allowed to contaminate grain intended for food, feed or commercial use.
- **bury** left-over treated seed or store it safely in labelled bags for future use as seed.
- **treated** seed offered for sale must be labelled with the name of the treated chemicals (Canada Seed Act).
- **treated** seed in transit must be bagged or bulk loads tarped to prevent spillage (Alberta Act).

Acrobat MZ *(dimethomorph + mancozeb)*

Manufacturer **Cyanamid Crop Protection**

1. **Formulations:** Wettable powder; 69%; 10 kg bag.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Fungi Controlled:** Early blight, late blight, tuber blight.
5. **When Used:** First application when disease threatens or when first visible signs of disease occur within the field or nearby. Apply every 5 - 7 days under high disease pressure or every 7 - 10 days under low disease pressure. Use a maximum of three applications of Acrobat MZ per season.
6. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate: 1 kg/ac.

   Water volume:
   Ground: At least 80 L of water per acre.
   Air: 20 L of water per acre.
7. **Application Tips:** Under low disease pressure, apply Acrobat MZ every 7 - 10 days; under high disease pressure, increase application frequency to every 5 - 7 days. Under high level of late blight infection, apply Acrobat MZ after topkill to control tuber blight. Good spray coverage. It is essential to use as part of a regularly scheduled preventative fungicide program. It is recommended to apply Acrobat MZ in alteration with fungicides having a different mode of action.
8. **How it Works:** Acrobat MZ provides the systemic activity of dimethomorph and the contact activity of mancozeb to prevent both early and late blight. The dimethomorph penetrates the plant and moves upward to protect the leaves and stems, while the contact activity prevents blight on the plant surface. Acrobat MZ has anti-sporulant activity and is active against most stages of the late blight pathogen.

   Effects of rainfall: Do not apply if rain is likely within 2 - 3 hours of spraying and apply to dry foliage.
9. **Grazing and Harvest Restrictions:** Do not apply Acrobat MZ within 14 days of harvest. Do not plant a new crop in the treated area within 120 days of the last application.
10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) 1971
11. **Precautions, First Aid:** During all activities, worker must wear long pants, long-sleeved shirt and boots. During mixing, loading, clean-up and repair activities, workers must also wear chemical-resistant gloves and safety goggles or a face shield.

    If in eyes: Flush eye with water. Get medical attention if irritation persists.

    If on skin: Wash skin with plenty of soap and water. Get medical attention if irritation persists.

    If swallowed: Dilute by giving 2 glasses of water and induce vomiting. Do not induce vomiting or give anything by mouth to an unconscious person.

    If inhaled: Move subject to fresh air.

    Symptoms of poisoning: Unknown.
    Keep out of reach of children and animals.

    For physician: There is no specific antidote for this product.

    In case of a spill: Wear personal protective equipment. Absorb spillage with sand or earth. Scrub contaminated surfaces with detergent solution and contact the manufacture or Provincial Regulatory Agency for disposal.

    Environmental precautions:
    Ground: A 50 m buffer zone should be observed adjacent to streams, ponds, rivers and lakes.
    Air: **Do not** spray within 100 m of streams, ponds, rivers and lakes.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

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12. **Storage:** Store under cool and dry conditions in secure, well ventilated buildings away from foodstuffs and animal feed and out of reach of children.

Agrox B-3/Agrox D-L Plus/ DLC *(diazinon + lindane + captan)*

Fungicide – Insecticide

Manufacturer **Norac/United Agri Products**

WARNING POISON

1. **Formulation:**

   Seed Treatment: Powders; Agrox B-3; 11% diazinon + 16.6% lindane + 33.5% captan; 2 kg container. Agrox D-L Plus, DLC, 15% diazinon + 25% lindane + 15% captan; 50 g container, 200 g and 500 g tube.

2. **Registered Mixes:** Use this product only on seed previously treated with captan or thiram. Do not use on seed already treated with an insecticide (other than methoxychlor or malathion).
3. **Crops:** Corn, beans, peas, soybeans.
4. **Fungi Controlled:** Captan in this formulation supplements previous fungicide treatment for seedling blight and seed rot.

   Insects controlled: Wireworms and seed corn maggots.

5. **When Used:** At planting time.
6. **How to Apply:**

   With: Protective equipment, using standard dry seed treatment methodology described. Agrox B-3 may be made into a slurry for application onto seed. Read label for specific mixing instructions.

   Drill Box Treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform color using the following mixing method (**Do not** mix with hands):

   1. Place and level 1/2 of the seed in drill box and sprinkle 1/2 of the required amount of product uniformly over seeds. Mix thoroughly with a paddle. Fill box with seed and sprinkle remaining 1/2 of product over seed, mix again. Thoroughly mix with a paddle when drillbox is 1/2 full and again when full.

   Rate:

Crop	Disease	Insect mL/[illegible] kg seed	Agrox B-3 mL/[illegible] kg seed	Agrox D-L Plus/ DLC
Corn	Seedling blight Seed rot	Wireworms Seed corn maggots	85	50
Beans	Seedling blight Seed rot	Wireworms Seed corn maggots	80	50
Peas	Seedling blight Seed rot	Wireworms Seed corn maggots	80	50
Soybean	Seedling blight Seed rot	Wireworms Seed corn maggots	60	50

7. **Application Tips:** Treat only the amount of seed to be sown to avoid the problem of storing treated seed.
8. **How it Works:** A protective seed treatment for the control of seedling diseases and the control of soil insects.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for food, feed or oil processing.

10. **Toxicity:** Oral LD_{50} (rats) (mg/kg) = lindane (88 - 125), captan (8,400 - 15,000), diazinon (300).
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Take patient to nearest hospital, taking the labelled container with you.

    Toxicology: Diazinon may cause cholinesterase inhibition. Atropine is antidotal.
12. **Storage:** Store in cool, dry place away from food or feed. Keep container closed when not in use. Keep away from fire and sparks. Stored treated grain should be labelled: **Do not use for food or feed. This seed has been treated with Agrox D-L Plus. Poisonous to man and animals. Keep out of reach of children.**

Apron FL *(metalaxyl)*

For Commercial Seed Treaters Only

Manufacturer **Gustafson**

1. **Formulation:** Water-based liquid suspension, 3.78 L package.
2. **Registered Mixes:** Apron FL may be applied to seed treated with Vitaflo 280, Vitavax rs Flowable or Thiram 75WP to provide a broader spectrum of disease control.
3. **Crops:** Alfalfa, birdsfoot trefoil, beans, chickpeas, canola, clover, corn (field and sweet), grasses (forage and turf), low tannin lentils, sugar beets, soybeans, vetch, peas, sunflowers and sainfoin.
4. **Fungi Controlled:** Seed rots and seedling blights caused by Pythium species. Early season Phytophthora in soybeans and downy mildew in sunflowers.
5. **When Used:** Apply as a seed treatment prior to planting. Apron FL is sold only to commercial seed treaters who can comply with regulations pertaining to colouration of treated seed enforced under the 'Seeds Act.'
6. **How to Apply:**

    With: Accurate seed treating equipment. Consult Gustafson for information on seed treating equipment, calibration and use of colourants. Seed quality should be checked before committing a seed lot to chemical treatment. Avoid treating mechanically-damaged seed.

    Rate: Apron FL should be mixed with water to form a slurry seed treatment. Mix Apron FL with water as follows:

Application Rate Table (mL per 100 kg seed)			
Crop	**Apron FL**	**Water**	**Total Vol.**
Chickpeas, dry peas	**16 - 110**	**484 - 390 mL**	**500 mL**
Canola, rapeseed, processing peas	**32 - 110**	**468 - 390 mL**	**500 mL**
Alfalfa, beans, clover, corn (field and sweet), sainfoin, vetch	**46 - 110**	**454 - 390 mL**	**500 mL**
Grasses (forage), soybeans	**46 - 93**	**454 - 407 mL**	**500 mL**
Grasses (turf), sugar beets	**93**	**407 mL**	**500 mL**
Sunflowers	**110 - 189***	**390 - 311 mL**	**500 mL**

* High rate needed for downy mildew control.

The slurry should be applied as a spray into the mixing chamber of the seed treating equipment to ensure good coverage.

Acrobat MZ (cont'd)

12. **Storage:** Store under cool and dry conditions in secure, well ventilated buildings away from foodstuffs and animal feed and out of reach of children.

Agrox B-3/Agrox D-L Plus/ DLC *(diazinon + lindane + captan)*

Fungicide – Insecticide

Manufacturer: **Norac/United Agri Products**

WARNING POISON

1. **Formulation:**

   Seed Treatment: Powders; Agrox B-3; 11% diazinon + 16.6% lindane + 33.5% captan; 2 kg container. Agrox D-L Plus, DLC, 15% diazinon + 25% lindane + 15% captan; 50 g container, 200 g and 500 g tube.

2. **Registered Mixes:** Use this product only on seed previously treated with captan or thiram. Do not use on seed already treated with an insecticide (other than methoxychlor or malathion).

3. **Crops:** Corn, beans, peas, soybeans.

4. **Fungi Controlled:** Captan in this formulation supplements previous fungicide treatment for seedling blight and seed rot.

   Insects controlled: Wireworms and seed corn maggots.

5. **When Used:** At planting time.

6. **How to Apply:**

   With: Protective equipment, using standard dry seed treatment methodology described. Agrox B-3 may be made into a slurry for application onto seed. Read label for specific mixing instructions.

   Drill Box Treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform color using the following mixing method (**Do not** mix with hands):

   1. Place and level 1/2 of the seed in drill box and sprinkle 1/2 of the required amount of product uniformly over seeds. Mix thoroughly with a paddle. Fill box with seed and sprinkle remaining 1/2 of product over seed, mix again. Thoroughly mix with a paddle when drillbox is 1/2 full and again when full.

   Rate:

Crop	Disease	Insect mL/25 kg/seed	Agrox B-3 mL/25 kg/seed	Agrox D-L Plus/ DLC
Corn	Seedling blight	Wireworms	85	50
	Seed rot	Seed corn maggots		
Beans	Seedling blight	Wireworms	80	50
	Seed rot	Seed corn maggots		
Peas	Seedling blight	Wireworms	80	50
	Seed rot	Seed corn maggots		
Soybean	Seedling blight	Wireworms	80	50
	Seed rot	Seed corn maggots		

7. **Application Tips:** Treat only the amount of seed to be sown to avoid the problem of storing treated seed.

8. **How it Works:** A protective seed treatment for the control of seedling diseases and the control of soil insects.

9. **Grazing and Harvest Restrictions:** Do not use treated seed for food, feed or oil processing.

10. **Toxicity:** Oral LD_{50} (rats) (mg/kg) = lindane (88 - 125), captan (8,400 - 15,000), diazinon (300).

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Take patient to nearest hospital, taking the labelled container with you.

    Toxicology: Diazinon may cause cholinesterase inhibition. Atropine is antidotal.

12. **Storage:** Store in cool, dry place away from food or feed. Keep container closed when not in use. Keep away from fire and sparks. Stored treated grain should be labelled: **Do not use for food or feed. This seed has been treated with Agrox D-L Plus. Poisonous to man and animals. Keep out of reach of children.**

Apron FL *(metalaxyl)*

For Commercial Seed Treaters Only

Manufacturer: **Gustafson**

1. **Formulation:** Water-based liquid suspension, 3.78 L package.
2. **Registered Mixes:** Apron FL may be applied to seed treated with Vitaflo 280, Vitavax rs Flowable or Thiram 75WP to provide a broader spectrum of disease control.
3. **Crops:** Alfalfa, birdsfoot trefoil, beans, chickpeas, canola, clover, corn (field and sweet), grasses (forage and turf), low tannin lentils, sugar beets, soybeans, vetch, peas, sunflowers and sainfoin.
4. **Fungi Controlled:** Seed rots and seedling blights caused by Pythium species. Early season Phytophthora in soybeans and downy mildew in sunflowers.
5. **When Used:** Apply as a seed treatment prior to planting. Apron FL is sold only to commercial seed treaters who can comply with regulations pertaining to colouration of treated seed enforced under the 'Seeds Act.'
6. **How to Apply:**

    With: Accurate seed treating equipment. Consult Gustafson for information on seed treating equipment, calibration and use of colourants. Seed quality should be checked before committing a seed lot to chemical treatment. Avoid treating mechanically-damaged seed.

    Rate: Apron FL should be mixed with water to form a slurry seed treatment. Mix Apron FL with water as follows:

Application Rate Table (mL per 100 kg seed)

Crop	Apron FL	Water	Total Vol.
Chickpeas, dry peas	16 - 110	484 - 390 mL	500 mL
Canola, rapeseed, processing peas	32 - 110	468 - 390 mL	500 mL
Alfalfa, beans, clover, corn (field and sweet), sainfoin, vetch	46 - 110	454 - 390 mL	500 mL
Grasses (forage), soybeans	46 - 93	454 - 407 mL	500 mL
Grasses (turf), sugar beets	93	407 mL	500 mL
Sunflowers	110 - 189*	390 - 311 mL	500 mL

* High rate needed for downy mildew control.

The slurry should be applied as a spray into the mixing chamber of the seed treating equipment to ensure good coverage.

See instructions supplied with the applicable treater system for information on proper application techniques.

Note: A suitable seed colourant such as Gustafson Pro-Ized Seed Colourant must be added to the slurry prior to application on seed. Follow instructions on the colourant package for mixing with the Apron FL slurry.

7. **Application Tips:** Use only recommended rates.
8. **How it Works:** Metalaxyl is a systemic fungicide that is absorbed into the germinating seed and is transported through the growing seedling, providing control of seed and seedling diseases.
9. **Grazing and Harvest Restrictions:** Do not graze or feed livestock on crops grown from treated seed for four weeks after planting.
10. **Toxicity:** Low mammalian toxicity value. Acute oral LD_{50} (rats) (mg/kg) = product 2,900. Mild skin irritant.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**
12. **Storage:**

    Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed.

Baytan 30 *(triadimenol)*

For Commercial Seed Treaters Only

Manufacturer **Gustafson**

1. **Formulation:** Water-based liquid suspension, 3.78 L package.
2. **Registered Mixes:** Baytan 30 may be applied to seed previously treated with Vitaflo 280.
3. **Crops:** Wheat, barley.
4. **Fungi Controlled:**

    Wheat: Controls smuts (True Loose Smut, Common Bunt), powdery mildew and suppresses take-all.

    Barley: Controls smuts (False Loose Smut, Covered Smut, True Loose Smut), leaf stripe, and suppresses net blotch, scald and common root rot.
5. **When Used:** Apply as a seed treatment prior to planting. Baytan 30 is sold only to commercial seed treaters who can comply with regulations pertaining to colouration of treated seed enforced under the 'Seeds Act.'
6. **How to Apply:** Baytan 30 will only be applied by certified commercial applicators. Consultation with a Gustafson technical representative is recommended for information on seed treating equipment and calibration, use of colourants and premixing with Vitaflo 280.

Rate:

[illegible]	mL Baytan 30 per 100 kg seed	mL water added	Slurry Application Rate
Spring wheat	50	200 - 450	250 - 500 mL
Barley			
Winter wheat	100	150 - 400	250 - 500 mL

Note: A suitable seed colourant such as Gustafson Pro-Ized Seed Colorant must be added to the slurry prior to application on seed. Follow instructions on the colourant package for mixing with the Baytan 30 slurry. The addition of a seed colourant is not required when applying Baytan 30 to seed already treated with Vitaflo 280. The seed will already be sufficiently coloured from the application of Vitaflo 280.

7. **Application Tips:**
   1. Certified commercial applicators are advised to consult with the manufacturer regarding special application procedures.
   2. Baytan treated seed should not be planted at depths exceeding 4 cm.
   3. Do not apply Baytan to mechanically damaged seed or to seed lots of unknown or poor quality.
8. **How it Works:** Triadimenol is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling providing control of seed and seedling diseases.
9. **Grazing and Harvest Restrictions:** Do not graze or feed livestock on crops grown from treated seed for 40 days after planting.
10. **Toxicity:** Low mammalian toxicity value. Acute oral LD_{50} (rats) (mg/kg) = product 3,300. Moderate skin irritant.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Administer water freely and induce vomiting by giving one dose (15 mL) of Syrup of Ipecac. If vomiting does not occur within 10 - 20 minutes, administer a second dose. If Syrup of Ipecac is not available, induce vomiting by sticking finger down throat. Repeat until vomit fluid is clear. Never give anything by mouth to an unconscious person. Contact a physician or poison control center. **If inhaled**, remove victim to fresh air. If breathing has ceased, clear airway and begin artificial respiration. If victim has difficulty breathing, give oxygen. Contact a physician or poison control center. **Keep out of reach of children.**
12. **Storage:**

    Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed.

Rate:

Crop Treated	mL Baytan 30 per 100 kg seed	mL water added	Slurry Application Rate
Spring wheat	50	200 - 450	250 - 500 mL
Barley			
Winter wheat	100	150 - 400	250 - 500 mL

Note: A suitable seed colourant such as Gustafson Pro-Ized Seed Colorant must be added to the slurry prior to application on seed. Follow instructions on the colourant package for mixing with the Baytan 30 slurry. The addition of a seed colourant is not required when applying Baytan 30 to seed already treated with Vitaflo 280. The seed will already be sufficiently coloured from the application of Vitaflo 280.

7. **Application Tips:**
   1. Certified commercial applicators are advised to consult with the manufacturer regarding special application procedures.
   2. Baytan treated seed should not be planted at depths exceeding 4 cm.
   3. Do not apply Baytan to mechanically damaged seed or to seed lots of unknown or poor quality.

8. **How it Works:** Triadimenol is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling providing control of seed and seedling diseases.

9. **Grazing and Harvest Restrictions:** Do not graze or feed livestock on crops grown from treated seed for 40 days after planting.

10. **Toxicity:** Low mammalian toxicity value. Acute oral LD_{50} (rats) (mg/kg) = product 3,300. Moderate skin irritant.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Administer water freely and induce vomiting by giving one dose (15 mL) of Syrup of Ipecac. If vomiting does not occur within 10 - 20 minutes, administer a second dose. If Syrup of Ipecac is not available, induce vomiting by sticking finger down throat. Repeat until vomit fluid is clear. Never give anything by mouth to an unconscious person. Contact a physician or poison control center. **If inhaled**, remove victim to fresh air. If breathing has ceased, clear airway and begin artificial respiration. If victim has difficulty breathing, give oxygen. Contact a physician or poison control center. **Keep out of reach of children.**

12. **Storage:**

    Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed.

Benlate 50WP/ Benlate Toss-N-Go *(benomyl)*

Manufacturer: **DuPont**

1. **Formulation:** Wettable powder; 50%; 10 kg bags.
   Toss-N-Go, 5 kg (5 x 1 kg water soluble pouches).
2. **Registered Mixes:** No registered mixes for canola or beans.

   Mixing restrictions: Do not mix with alkaline pesticides such as basic copper sulphate, Bordeaux mixture or lime sulphur. Do not tank mix or alternate Benlate with thiophanate products such as Easout.

   Mixing instructions:
   1. Wear protective clothing such as coveralls, goggles or face shield, and suitable chemical resistant gloves during mixing and loading. Do not handle Toss-N-Go® bags with wet gloves or place on wet surfaces.
   2. Fill spray tank half full with clean water and engage agitation. Use sufficient volume of water to provide thorough mixing.
   3. Add the required number of Toss-N-Go® bags to the spray tank. Continuous agitation is required to dissolve the Toss-N-Go® bags and to keep Benlate® in suspension.
   4. Complete the filling of the spray tank with water. Apply the mixture the same day. Do not leave overnight.
3. **Crops:** Beans (dry, lima, snap), canola, alfalfa grown for seed.
4. **Fungi Controlled:** Botrytis (beans), Sclerotinia (beans, canola), Sclerotinia, Botrytis (alfalfa).
5. **When Used:** Do not make more than 2 applications per crop unless otherwise specified.

   Beans: Between 50% and full bloom.

   Canola: Can be applied up to the 50% bloom stage. Optimal protection is the 20 - 30% bloom stage which is before the first petals begin to fall and when there is the maximum number of petals and buds that can be covered by the spray application.

   Alfalfa: Alfalfa for seed from early to late bloom, (not more than 2 applications per year).
6. **How to Apply:**

   With: Aircraft or ground equipment.

   Water volume: Beans: air – 16 L/ac, ground – 40 - 80 L/ac. Canola: air - 16 L/ac minimum, ground – 32 - 40 L/ac.

   Nozzles: Flat fan or hollow cone.

   Rate: Use the high rate for application after 30% bloom, or under severe or prolonged disease conditions, high humidity or excessive rainfall.

Crop	Disease	g/ac
Beans, (dry, lima, snap)	**Botrytis** (gray mold), **Sclerotinia** (white mold)	710 - 910
Canola	**Sclerotinia** (stem rot)	300 - 600
Seed alfalfa	**Sclerotinia, Botrytis** (seed rot)	600

7. **Application Tips:** Canola: Thorough coverage of plant parts prior to infection is essential for effective disease control. Ensure continuous agitation in the spray tank until all the spray solution is sprayed out.
8. **How it Works:** Benomyl is a protective systemic fungicide.

   Effects of rainfall: Rainfree period is 1 - 2 hours. Effects of irrigation: do not irrigate within 6 hours of application.
9. **Grazing and Harvest Restrictions:** Pre-harvest interval (days): beans (14). Do not graze or feed treated bean hay or alfalfa to livestock.

Benlate 50WP/ Benlate Toss-N-Go *(benomyl)*

Manufacturer: **DuPont**

1. **Formulation:** Wettable powder; 50%; 10 kg bags.
   Toss-N-Go, 5 kg (5 x 1 kg water soluble pouches).
2. **Registered Mixes:** No registered mixes for canola or beans.

   Mixing restrictions: Do not mix with alkaline pesticides such as basic copper sulphate, Bordeaux mixture or lime sulphur. Do not tank mix or alternate Benlate with thiophanate products such as Easout.

   Mixing instructions:
   1. Wear protective clothing such as coveralls, goggles or face shield, and suitable chemical resistant gloves during mixing and loading. Do not handle Toss-N-Go® bags with wet gloves or place on wet surfaces.
   2. Fill spray tank half full with clean water and engage agitation. Use sufficient volume of water to provide thorough mixing.
   3. Add the required number of Toss-N-Go® bags to the spray tank. Continuous agitation is required to dissolve the Toss-N-Go® bags and to keep Benlate® in suspension.
   4. Complete the filling of the spray tank with water. Apply the mixture the same day. Do not leave overnight.
3. **Crops:** Beans (dry, lima, snap), canola, alfalfa grown for seed.
4. **Fungi Controlled:** Botrytis (beans), Sclerotinia (beans, canola), Sclerotinia, Botrytis (alfalfa).
5. **When Used:** Do not make more than 2 applications per crop unless otherwise specified.

   Beans: Between 50% and full bloom.

   Canola: Can be applied up to the 50% bloom stage. Optimal protection is the 20 - 30% bloom stage which is before the first petals begin to fall and when there is the maximum number of petals and buds that can be covered by the spray application.

   Alfalfa: Alfalfa for seed from early to late bloom, (not more than 2 applications per year).
6. **How to Apply:**

   With: Aircraft or ground equipment.

   Water volume: Beans: air – 16 L/ac, ground – 40 - 80 L/ac. Canola: air – 16 L/ac minimum, ground – 32 - 40 L/ac.

   Nozzles: Flat fan or hollow cone.

   Rate: Use the high rate for application after 30% bloom, or under severe or prolonged disease conditions, high humidity or excessive rainfall.

Crop	[illegible]	g/ac
Beans, (dry, lima, snap)	**Botrytis** (gray mold), **Sclerotinia** (white mold)	710 - 910
Canola	**Sclerotinia** (stem rot)	300 - 600
Seed alfalfa	**Sclerotinia, Botrytis** (seed rot)	600

7. **Application Tips:** Canola: Thorough coverage of plant parts prior to infection is essential for effective disease control. Ensure continuous agitation in the spray tank until all the spray solution is sprayed out.
8. **How it Works:** Benomyl is a protective systemic fungicide.

   Effects of rainfall: Rainfree period is 1 - 2 hours. Effects of irrigation: do not irrigate within 6 hours of application.
9. **Grazing and Harvest Restrictions:** Pre-harvest interval (days): beans (14). Do not graze or feed treated bean hay or alfalfa to livestock.

10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (greater than 10,000). May irritate eyes, nose, throat and skin. Toxic to fish.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**
12. **Storage:** Never allow product to become wet during storage as reduced fungicidal effectiveness may result. Keep container closed when not in use. Keep away from fire or sparks.

    Directions for use with seed alfalfa: The directions for use for this product on seed alfalfa as described on this Supplementary Label were developed by persons other than DuPont Canada Inc. and accepted for registration by Health Canada under the *User Requested Minor Use Label Expansion* program. DuPont Canada Inc. itself makes no representation or warranty with respect to product performance (efficacy) and crop tolerance (phytotoxicity) of this product when used on the crop listed on this Supplementary Label. Accordingly, the buyer and user assume all liability arising and agree to hold DuPont Canada Inc. harmless from any claims based on efficacy or phytotoxicity in connection with this use described on this Supplementary Label.

Bravo 500 *(chlorothalonil)*

Manufacturer **Zeneca Agro**

CAUTION POISON

1. **Formulation:** Flowable; 50%; 10 L, 110 L, 200 L.
2. **Registered Mixes:** None.

   Mixing instructions: The required amount of Bravo 500 should be added slowly into the spray tank during filling. With concentrate sprays, premix the required amount of Bravo 500 in a clean container and add to the spray tank as it is being filled. Keep agitator running when filling spray tank and during spray operations.
3. **Crops:** Blueberry, carrot, celery, chick peas, cole crops (broccoli, brussel sprouts, cabbage, cauliflower), conifers, cucumber, field peas, lentil, melons, potato, pumpkin, squash, sweet corn, tomato, strawberry, wheat.
4. **Fungi Controlled:** Anthracnose, Ascochyta (chick peas, lentils, field peas), early and late blight, Botrytis (potatoes), Tan spot, septoria leaf spot, septoria glume blotch, suppression of fusarium head blight (wheat).
5. **When Used:** Bravo 500 can be used effectively in diluted or concentrated sprays.
6. **How to Apply:**

   With: Ground field sprayers, high clearance sprayers, aircraft.

   Water volume: 91 - 650 L/acre for dilute applications; 20 - 40 L/acre for concentrate ground and aerial applications.

   Pressure: 345 kPa - 1380 kPa.

   Nozzles: Hollow cone or flat fan. Cone type nozzles are preferred since they will improve coverage.

Bravo 500 (cont'd)

Rate:

Crop/disease	Use recommendation
Lentil Anthracnose, Ascochyta	Use 0.8 - 1.6 L/acre in 91 - 650 L water/acre. The best effect of one application is at early flowering. If two applications are made, it is best to spray about one week before flowering and 10 - 14 days later, or at early and mid-flowering, before the rows are closing in to form a dense canopy. The choice of rate and time of application will depend on the disease pressure in the field and the frequency of rain. Do not make more than two applications per season. Do not apply within 48 days of harvest.
Chick pea Ascochyta	Use 1.2 L - 1.6 L/acre in the first application and 0.8 L - 1.2 L/acre in subsequent applications. Make the first application at *very* early flowering and remaining applications at 10 day intervals. Do not make more than three applications per season. Do not apply within 48 days of harvest.
Potato Late blight, early blight, Botrytis, vine rot	Use 0.5 - 1.0 L/acre for late blight. Use 0.65 - 1.0 L/acre for early blight and botrytis vine rot. Use sufficient water to obtain adequate spray coverage. Begin applications when plants are 15 - 20 cm high or when disease threatens. Repeat applications at 7 - 10 day intervals or as necessary to maintain disease control. Under severe disease conditions, use the higher rates at 7-day intervals. Do not apply to potato plants later than one day before harvest.
Field Peas Ascochyta blight, *Mycosphaerella pinodes*	Apply Bravo at a rate of 0.8 L to 1.25 L/acre beginning at early flowering. Make a second application at early pod set (mid-flowering), about 10 days after the first application. Should conditions favorable for disease prevail, make a third application at pod filling (late flower), about 10 - 14 days after the second application. Always apply the higher rate when conditions are favorable for disease. Do not make more than 3 applications per season. Do not apply within 32 days of harvest.
Wheat Tan spot, Septoria leafspot, Septoria glume blotch	Apply Bravo at 0.6 L to 1.0 L/acre at Zadok's growth stage 37 (flag leaf emergence), and repeat 10 - 14 days later at Zadok's growth stage 51 - 55 (head visible). A third application at Zadok's 59 - 69 (head fully visible), may be necessary if conditions favor disease spread.
Wheat Suppression of Fusarium head blight	Apply Bravo at 0.8 L to 1.0 L/acre at Zadok's growth stage 61 - 65 (early flowering), to suppress Fusarium head blight. For best results, this application must be made prior to conditions favoring infection, before flowering has started in the majority of tillers. Do not make more than 3 applications per season. Do not apply within 30 days of harvest.

7. **Application Tips:** Thorough, uniform coverage is essential for disease control.
8. **How it Works:** A contact and protectant fungicide.
9. **Grazing and Harvest Restrictions:** Do not feed treated material to livestock.

Crop	Days to harvest
Chick pea, Lentil	48
Potato	1
Field peas	32
Wheat	30

10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg)(4,200).

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Take labelled container with you. **Keep out of reach of children.** Avoid breathing spray mist.

    Precautions: Do not re-enter treated area within 48 hours. If required, individuals may re-enter treated area within 48 hours for short term tasks not involving hand labor, only if at least 4 hours has passed since application. Long pants, long-sleeved shirt, hat and chemical resistant gloves should be worn.

    Note: Bravo 500 may produce temporary allergic side effects, characterized by redness of the eyes, mild bronchial irritation and redness or rash on exposed skin areas. Persons having allergic reaction should contact a physician. Affected persons respond to treatment with antihistamines or steroid creams and/or systemic steroids. Apply only to areas specified on label. This product is toxic to fish. Keep out of lakes, streams or ponds. **Do not** contaminate water by cleaning of equipment or disposal of wastes. **Do not** apply where runoff is likely to occur. **Do not** apply when weather conditions favour drift from areas being treated.

12. **Storage:** Do not store near food or feed. Protect from excessive heat.

Bravo/Ridomil *(chlorothalonil + metalaxyl)*

Manufacturer: **Novartis Crop Protection Canada Inc.**

WARNING POISON

1. **Formulation:** Liquid; chlorothalonil 500 g/L + metalaxyl 249 g/L; 2 x 11.3 L.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Fungi Controlled:** Early blight, late blight, Botrytis vine rot, late blight tuber rot.
5. **When Used:** It is recommended that Bravo/Ridomil be used within an Integrated Pest Management Program, (sound seed, field selection and rotation, field monitoring, use program of recommended contact fungicides).

    For early blight, late blight, Botrytis vine rot: Begin preventative applications early in the season when conditions are favorable for disease, **(before disease infection)**, but no later that when plant foliage meets within the row uniformly across the field. Make up to three applications of Bravo/Ridomil at 14-day intervals. Apply the recommended label rate of a contact fungicide before, between and after Bravo/Ridomil applications.

    For late blight tuber rot: For effective control of this storage rot, Bravo/Ridomil should be used in conjunction with other management practices such as crop rotation. Apply Bravo/Ridomil at the time of flowering and make a second application 14 days later. If the field has a history of tuber disease problems, make a third application 14 days after the second one.

Bravo 500 (cont'd)

Rate:

Lentil Anthracnose, Ascochyta	Use 0.8 - 1.6 L/acre in 91 - 650 L water/acre. The best effect of one application is at early flowering. If two applications are made, it is best to spray about one week before flowering and 10 - 14 days later, or at early and mid-flowering, before the rows are closing in to form a dense canopy. The choice of rate and time of application will depend on the disease pressure in the field and the frequency of rain. Do not make more than two applications per season. Do not apply within 48 days of harvest.
Chick pea Ascochyta	Use 1.2 L - 1.6 L/acre in the first application and 0.8 L - 1.2 L/acre in subsequent applications. Make the first application at *very* early flowering and remaining applications at 10 day intervals. Do not make more than three applications per season. Do not apply within 48 days of harvest.
Potato Late blight, early blight, Botrytis, vine rot	Use 0.5 - 1.0 L/acre for late blight. Use 0.65 - 1.0 L/acre for early blight and botrytis vine rot. Use sufficient water to obtain adequate spray coverage. Begin applications when plants are 15 - 20 cm high or when disease threatens. Repeat applications at 7 - 10 day intervals or as necessary to maintain disease control. Under severe disease conditions, use the higher rates at 7-day intervals. Do not apply to potato plants later than one day before harvest.
Field Peas Ascochyta blight, *Mycosphaerella pinodes*	Apply Bravo at a rate of 0.8 L to 1.25 L/acre beginning at early flowering. Make a second application at early pod set (mid-flowering), about 10 days after the first application. Should conditions favorable for disease prevail, make a third application at pod filling (late flower), about 10 - 14 days after the second application. Always apply the higher rate when conditions are favorable for disease. Do not make more than 3 applications per season. Do not apply within 32 days of harvest.
Wheat Tan spot, Septoria leafspot, Septoria glume blotch	Apply Bravo at 0.6 L to 1.0 L/acre at Zadok's growth stage 37 (flag leaf emergence), and repeat 10 - 14 days later at Zadok's growth stage 51 - 55 (head visible). A third application at Zadok's 59 - 69 (head fully visible), may be necessary if conditions favor disease spread.
Wheat Suppression of Fusarium head blight	Apply Bravo at 0.8 L to 1.0 L/acre at Zadok's growth stage 61 - 65 (early flowering), to suppress Fusarium head blight. For best results, this application must be made prior to conditions favoring infection, before flowering has started in the majority of tillers. Do not make more than 3 applications per season. Do not apply within 30 days of harvest.

7. **Application Tips:** Thorough, uniform coverage is essential for disease control.
8. **How it Works:** A contact and protectant fungicide.
9. **Grazing and Harvest Restrictions:** Do not feed treated material to livestock.

[illegible]	[illegible]
Chick pea, Lentil	48
Potato	1
Field peas	32
Wheat	30

10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg)(4,200).
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Take labelled container with you. **Keep out of reach of children.** Avoid breathing spray mist.

    Precautions: Do not re-enter treated area within 48 hours. If required, individuals may re-enter treated area within 48 hours for short term tasks not involving hand labor, only if at least 4 hours has passed since application. Long pants, long-sleeved shirt, hat and chemical resistant gloves should be worn.

    Note: Bravo 500 may produce temporary allergic side effects, characterized by redness of the eyes, mild bronchial irritation and redness or rash on exposed skin areas. Persons having allergic reaction should contact a physician. Affected persons respond to treatment with antihistamines or steroid creams and/or systemic steroids. Apply only to areas specified on label. This product is toxic to fish. Keep out of lakes, streams or ponds. **Do not** contaminate water by cleaning of equipment or disposal of wastes. **Do not** apply where runoff is likely to occur. **Do not** apply when weather conditions favour drift from areas being treated.
12. **Storage:** Do not store near food or feed. Protect from excessive heat.

Bravo/Ridomil *(chlorothalonil + metalaxyl)*

Manufacturer: **Novartis Crop Protection Canada Inc.**

WARNING POISON

1. **Formulation:** Liquid; chlorothalonil 500 g/L + metalaxyl 249 g/L; 2 x 11.3 L.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Fungi Controlled:** Early blight, late blight, Botrytis vine rot, late blight tuber rot.
5. **When Used:** It is recommended that Bravo/Ridomil be used within an Integrated Pest Management Program, (sound seed, field selection and rotation, field monitoring, use program of recommended contact fungicides).

    For early blight, late blight, Botrytis vine rot: Begin preventative applications early in the season when conditions are favorable for disease, **(before disease infection)**, but no later that when plant foliage meets within the row uniformly across the field. Make up to three applications of Bravo/Ridomil at 14-day intervals. Apply the recommended label rate of a contact fungicide before, between and after Bravo/Ridomil applications.

    For late blight tuber rot: For effective control of this storage rot, Bravo/Ridomil should be used in conjunction with other management practices such as crop rotation. Apply Bravo/Ridomil at the time of flowering and make a second application 14 days later. If the field has a history of tuber disease problems, make a third application 14 days after the second one.

Bravo/Ridomil (cont'd)

Use limitations: To minimize the risk of resistance, do not use Bravo/Ridomil more than three times per season. Discontinue use when potato vines start to look mature. Do not tank mix Bravo/Ridomil with potato top killer.

6. **How to Apply:**

   With: Aircraft or ground equipment.

   Water volume: Ground: Minimum or 91 L water/acre. Air: Minimum of 20 L water/acre.

   Pressure: 275 kPa.

   Nozzles: Flat fan. Spray screens should be no finer than 50 mesh. For aerial application, adjust nozzles to provide a medium droplet size of 200 - 400 microns. Sprays: Do not let tank contents stand for prolonged periods without agitation.

   Rate: One 11.3 L jug will treat 10 acres. Do not attempt to measure from this jug. The entire contents must be added to the spray tank or an improper mixture will result.

7. **Application Tips:** Under severe late blight conditions, the shorter 10-day interval is recommended. When changing from Bravo/Ridomil to a contact fungicide, apply within 10 days of the last Bravo/Ridomil application. Do not contaminate bodies of water through application sprays, clean-up or run off. Do not apply when weather conditions favour drift from treated areas. Consult local authorities as to the determination of adequate buffer zones. Not recommended for disease control in greenhouses.

8. **How it Works:** Bravo/Ridomil is a combination of a systemic and contact fungicide. It has both preventative and curative activity against fungi of the order Peronosporales – this includes the late blight fungus.

9. **Grazing and Harvest Restrictions:** Potato vines are naturally poisonous and should never be fed to livestock.

10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg), chlorothalonil (10,000), metalaxyl (669).

11. **Precautions, First Aid:** Protect yourself from eye, skin and respiratory exposure. Causes severe eye damage. Wear full protective clothing – long-sleeved shirt, long pants, coveralls, chemical resistant gloves, rubber boots, **goggles** – during mixing, loading, application, clean-up and repair. Wear a respirator, **goggles** or a face shield during mixing and loading. **In case of eye contact**, flush with plenty of water for 15 minutes and get immediate medical attention. **In case of skin contact**, wash thoroughly with soap and water. Seek medical attention if skin irritation persists. **If inhaled**, move to fresh air and monitor. **If ingested**, give water or milk and seek immediate medical attention at a poison control center or medical facility. Do not induce vomiting. There is no specific antidote; treat symptomatically.

    Symptoms of poisoning: Redness of the eyes, mild bronchial irritation, redness or rash on exposed skin areas.

12. **Storage:** Store in a dry, heated area and maintain above 0°C. Keep away from sources of heat. Avoid storage with food or feed.

Captan FL *(captan)*

Manufacturer' **Norac**

1. **Formulation:** Flowable; 30% liquid suspension.
2. **Registered Mixes:** None.
3. **Crops:** Beans (snap, dry, lima), corn (field, sweet), peas, soybeans, sugar beets.
4. **Fungi Controlled:** Seed decay, root rot, damping off and seedling blight.
5. **When Used:** A seed treatment in the slurry method applied prior to seeding.

6. **How to Apply:**

With: Protective equipment, using standard seed treatment methodology described.

Slurry method: Apply in slurry treater equipment with the amount of water required. Seed treated by this method should be dried before bagging.

Rate:

Crop	Disease	30% Captan FL ml/25 kg/seed
Bean, pea soybean	Seed decay, root rot, damping off, seedling blight	70
Corn - field	Seed decay, root rot, damping off, seedling blight	30 - 50
Corn - sweet	Seed decay, root rot, damping off, seedling blight	60 - 85
Sugar beet	Seed decay, root rot, damping off, seedling blight	155

* This rate is to be applied only by a professional applicator to ensure complete and uniform coverage.

7. **Application Tips:** None.
8. **How it Works:** A protective seed treatment for the control of seedling diseases.
9. **Grazing and Harvest Restrictions:** Do not feed treated seed to livestock. Do not expose treated seed to birds and other wildlife.
10. **Toxicity:** Low mammalian toxicity. Captain LD_{50} (rats) = 8,400.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Take labelled container with you.
12. **Storage:** In cool, dry place away from flammable materials and sources of heat and flame and away from foodstuffs. Stored treated grain should be labelled: **Do not use for food or feed. This seed has been treated with captan.**

Crown *(carbathiin + thiabendazole)*

Manufacturer: **Gustafson**

1. **Formulation:** 10 L jug; 92 g/L carbathiin + 58 g/L thiabendazole, 10 L jug.
2. **Registered Mixes:** None.
3. **Crops:** Lentils.
4. **Fungi Controlled:** Asochyta seedling blight and seed rot.
5. **When Used:** Pre-seeding or drill box treatment.
6. **How to Apply:**

With: Protective equipment, using standard dry seed treatment methodology described. Seed-dressing equipment for liquid formulations. Clean planter plates periodically to prevent excessive chemical powder build-up.

Pre-seeding treatment: Crown can be applied in a continuous treating operation with S-Series Treaters or OFT Treaters (Uniroyal Chemical), batch treaters or cement mixers.

Rate: 0.15 L per 25 kg of seed.

6. **How to Apply:**

   With: Protective equipment, using standard seed treatment methodology described.

   Slurry method: Apply in slurry treater equipment with the amount of water required. Seed treated by this method should be dried before bagging.

   Rate:

Crop	Disease	30% Captan FL mL/25 kg/seed
Bean, pea soybean	Seed decay, root rot, damping off, seedling blight	70
Corn - field	Seed decay, root rot, damping off, seedling blight	30 - 50
Corn - sweet	Seed decay, root rot, damping off, seedling blight	60 - 85
Sugar beet	Seed decay, root rot, damping off, seedling blight	155

* This rate is to be applied only by a professional applicator to ensure complete and uniform coverage.

7. **Application Tips:** None.
8. **How it Works:** A protective seed treatment for the control of seedling diseases.
9. **Grazing and Harvest Restrictions:** Do not feed treated seed to livestock. Do not expose treated seed to birds and other wildlife.
10. **Toxicity:** Low mammalian toxicity. Captain LD_{50} (rats) = 8,400.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Take labelled container with you.
12. **Storage:** In cool, dry place away from flammable materials and sources of heat and flame and away from foodstuffs. Stored treated grain should be labelled: **Do not use for food or feed. This seed has been treated with captan.**

Crown *(carbathiin + thiabendazole)*

Manufacturer: **Gustafson**

1. **Formulation:** 10 L jug; 92 g/L carbathiin + 58 g/L thiabendazole, 10 L jug.
2. **Registered Mixes:** None.
3. **Crops:** Lentils.
4. **Fungi Controlled:** Asochyta seedling blight and seed rot.
5. **When Used:** Pre-seeding or drill box treatment.
6. **How to Apply:**

   With: Protective equipment, using standard dry seed treatment methodology described. Seed-dressing equipment for liquid formulations. Clean planter plates periodically to prevent excessive chemical powder build-up.

   Pre-seeding treatment: Crown can be applied in a continuous treating operation with S-Series Treaters or OFT Treaters (Uniroyal Chemical), batch treaters or cement mixers.

   Rate: 0.15 L per 25 kg of seed.

Crown (cont'd)

7. **Application Tips:** It is important that the seed and chemical are mixed quickly and uniformly. Crown's liquid properties enable this product to act as a sticker for innoculants. The product is SAFE to the nitrogen fixing bacterium found in peat and granular innoculants.
8. **How it Works:** Thiabendazole, a fungicide, controls seed-borne diseases. Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling. Controls the diseases listed.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for feed, food or oil processing. Do not leave treated seed exposed to birds or animals.
10. **Toxicity:** Acute oral LD_{50} (rats) (mg/kg); carbathiin (3,820); thiabendazole (3,300).
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots and rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning Clothing and Equipment* (see page 32) before reuse. Get medical attention immediately for eyes. **Keep out of reach of children. If in eyes**, flush immediately with running water. **If on skin**, wash with warm water and soap. **If swallowed**, seek medical attention immediately.

    Symptoms of poisoning: Skin contact with fungicides may result in irritation and dermatitis.
12. **Storage:** Do not store in or around the home. Do not store Crown at temperatures below 0°C or exceeding 35°C. Label stored, treated seed with: **Do not use for food, feed or oil-processing. This seed has been treated with carbathiin + thiabendazole. Poisonous to man and animals. Keep out of reach of children.**

Dithane DG/Dithane Rainshield NT/Manzate 200/ MancoPlus/Tuberseal/ Potato Seed Treatment *(mancozeb)*

Manufacturer: **Rohm and Haas/DuPont/Norac/United Agri Products**

1. **Formulation:** Dispersible Granule; Dithane DG/Dithane Rainshield NT; 75%; 20 kg bag. Manzate 200; 80%; 2.5 kg, 20 kg bags. Dust; MancoPlus; Tuberseal; 16%; 10 kg bags, Potato Seed Treatment; 80%, 20 kg bag.
2. **Registered Mixes:** A dust may be prepared by diluting and thoroughly mixing Manzate 200 with prophylite or other neutral diluent; commonly used insecticides may displace an equivalent amount of diluent. Use dust mixtures as soon as possible after preparation. A spreader-sticker may be added to Manzate 200 in spray preparations.
3. **Crops:** Corn, potatoes, sugar beets, wheat (durum, semi-dwarf, soft white, spring, winter).

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Dithane DG/Dithane Rainshield NT/Manzate 200/MancoPlus/Tuberseal/Potato Seed Treatment (cont'd)

4. **Fungi Controlled:**

cercospora leaf spot (sugar beet)
early and late blights (potato)
fusarium decay (potato)
leaf rust (wheat)
root rot (corn)
seedling blight (corn)
septoria (wheat)
tan spot (wheat)

5. **When Used:** Potato seed pieces and corn seed: treat before planting. Early and late blights in potatoes: apply when plants are 10 - 15 cm tall; repeat at 7 - 10 day intervals. Cercospora leaf spot in sugar beets: apply when disease first threatens and repeat at 7 - 10 day intervals. Foliar spray on wheat: an **early application** can be made at Feeks 1 - 3 growth stage or when crop is in the 3 leaf to tillering stage and/or a **late application** can be made at Feeks 10.5 when the head is fully emerged but prior to flowering.

6. **How to Apply:**

With: Potato seed duster, aircraft, ground equipment.

Water volume: Aircraft: 16 L/ac; Ground: 40 - 81 L/ac; Sugar beets: 324 L/ac.

Pressure: 345 kPa.

Nozzles: Hollow cones or flat fan recommended.

Rate: Potatoes: Start with low rate and increase to maximum rate as foliage develops.

[illegible]	[illegible]	[illegible]	[illegible]
Corn seed	Root rot, seedling blight	Manzate 200	0.22 kg/100 kg seed
Potato seed pieces	Fusarium decay	Tuberseal	0.5 kg/100 kg seed
		Manzate 200, Potato seed	1.0 kg/100 kg seed
Potatoes (foliar spray)	Early and late blight	Dithane DG, Manzate 200, Dithane Rainshield NT	0.44 - 0.90 kg/ac
Sugar beets (foliar spray)	Cercospora leaf spot	Dithane DG, Manzate 200, Dithane Rainshield NT	0.91 kg/ac
Wheat (foliar spray)	Leaf rust, tan spot, septoria	Dithane DG, Dithane Rainshield NT	early spray: 0.45 kg/ac late spray 0.9 kg/ac

7. **Application Tips:**

Corn seed: Apply as dust or slurry. Treated seed should not be stored.

Potato seed pieces: Thoroughly coat the surface of whole or cut potato pieces. If treated whole seed is cut, make a second application. Plant as soon as possible after treating. If planting is delayed beyond 2 days after treating, seed should be air dried before bagging or loose piling.

Sprays: Continuous agitation required.

8. **How it Works:** A protective seed-treatment fungicide that controls fusarium decay. A contact fungicide.

9. **Grazing and Harvest Restrictions:** Pre-harvest interval (days): potatoes (1), sugar beets (21), wheat (40).

10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = mancozeb (11,200). Prolonged exposure may cause eye, nose, throat and skin irritation.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention.

12. **Storage:** Store in a cool, dry, ventilated place away from fire and sparks. Do not allow product to become wet or overheated during storage as chemical changes may reduce fungicidal effectiveness and flammable vapors may be generated. Treated seed should be labelled **"Do not use for food or feed. This seed has been treated with mancozeb. Poisonous to man and animals." Keep out of reach of children.**

4. Fungi Controlled:

cercospora leaf spot (sugar beet)
early and late blights (potato)
fusarium decay (potato)
leaf rust (wheat)
root rot (corn)
seedling blight (corn)
septoria (wheat)
tan spot (wheat)

5. When Used: Potato seed pieces and corn seed: treat before planting. Early and late blights in potatoes: apply when plants are 10 - 15 cm tall; repeat at 7 - 10 day intervals. Cercospora leaf spot in sugar beets: apply when disease first threatens and repeat at 7 - 10 day intervals. Foliar spray on wheat: an **early application** can be made at Feeks 1 - 3 growth stage or when crop is in the 3 leaf to tillering stage and/or a **late application** can be made at Feeks 10.5 when the head is fully emerged but prior to flowering.

6. How to Apply:

With: Potato seed duster, aircraft, ground equipment.

Water volume: Aircraft: 16 L/ac; Ground: 40 - 81 L/ac; Sugar beets: 324 L/ac.

Pressure: 345 kPa.

Nozzles: Hollow cones or flat fan recommended.

Rate: Potatoes: Start with low rate and increase to maximum rate as foliage develops.

Crop	Disease	Formulation	Quantity
Corn seed	Root rot, seedling blight	Manzate 200	0.22 kg/100 kg seed
Potato seed pieces	Fusarium decay	Tuberseal	0.5 kg/100 kg seed
		Manzate 200, Potato seed	1.0 kg/100 kg seed
Potatoes (foliar spray)	Early and late blight	Dithane DG, Manzate 200, Dithane Rainshield NT	0.44 - 0.90 kg/ac
Sugar beets (foliar spray)	Cercospora leaf spot	Dithane DG, Manzate 200, Dithane Rainshield NT	0.91 kg/ac
Wheat (foliar spray)	Leaf rust, tan spot, septoria	Dithane DG, Dithane Rainshield NT	early spray: 0.45 kg/ac late spray 0.9 kg/ac

7. Application Tips:

Corn seed: Apply as dust or slurry. Treated seed should not be stored.

Potato seed pieces: Thoroughly coat the surface of whole or cut potato pieces. If treated whole seed is cut, make a second application. Plant as soon as possible after treating. If planting is delayed beyond 2 days after treating, seed should be air dried before bagging or loose piling.

Sprays: Continuous agitation required.

8. How it Works: A protective seed-treatment fungicide that controls fusarium decay. A contact fungicide.

9. Grazing and Harvest Restrictions: Pre-harvest interval (days): potatoes (1), sugar beets (21), wheat (40).

10. Toxicity: Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = mancozeb (11,200). Prolonged exposure may cause eye, nose, throat and skin irritation.

11. Precautions, First Aid: Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention.

12. Storage: Store in a cool, dry, ventilated place away from fire and sparks. Do not allow product to become wet or overheated during storage as chemical changes may reduce fungicidal effectiveness and flammable vapors may be generated. Treated seed should be labelled **"Do not use for food or feed. This seed has been treated with mancozeb. Poisonous to man and animals." Keep out of reach of children.**

Dividend XL RTA

Manufacturer: **Novartis**

WARNING POISON

1. **Formulation:** 3.48% FS; 3.21% difenoconazole + 0.27% metalaxyl-M: 2 x 10 L jugs.
2. **Registered Mixes:** None.
3. **Crops:** Wheat (durum, spring and winter varieties).
4. **Fungi Controlled:** Common bunt (seed-borne and soil-borne), dwarf bunt, loose smut, seed-borne septoria, seed-borne fusarium, general seed rots (caused by saprophytic fungi such as *Penicillium* and *Aspergillus*), pythium damping-off, early season control of septoria leaf blotch.

   Fungi Suppressed: Common root rot (*Cochliobolus* spp.) and take-all.
5. **When Used:** Treat seed prior to or at seeding.
6. **How to Apply:**

   With: Dividend XL RTA may be applied to seed with any standard gravity flow or mist-type seed treatment equipment that accurately meters and mixes a flowable seed treatment. Dividend XL RTA may also be used with treat-on-the-go air seeders. The application equipment used must provide uniform coverage of Dividend XL RTA on the seed. Uneven seed coverage may not give the desired level of disease control.

   Rate:

Crop	Disease	mL/100 kg seed
Winter wheat	common bunt[3], dwarf bunt, loose smut, seed-borne fusarium, general seed rots[4], pythium damping off. Suppression of common root rot (*Cochliobolus* spp.) and take-all[2], seed-borne septoria[5] and septoria leaf blotch[1,5]	325 - 650
Spring and durum wheat	common bunt[3], loose smut, seed-borne fusarium, general seed rots[4], pythium damping off. Suppression of common root rot (*Cochliobolus* spp.) and take-all[2], seed-borne septoria[5]	325 - 650

[1] Dividend XL RTA provides control of early season *Septoria* leaf blotch in winter wheat for the first 6 weeks after planting. For full season control, apply a foliar fungicide according to label directions.

[2] Suppression means consistent control at a level that is not optimal but is still of commercial benefit.

[3] Dividend XL RTA controls both seed-borne and soil-borne common bunt.

[4] General seed rots controlled include those caused by saprophytic organisms such as *Penicillium* and *Aspergillus*.

[5] For control of seed-borne septoria and septoria leaf blotch, use the higher rate of 650 mL/100 kg of seed.

Note: One 10 L jug of Dividend XL RTA applied at the 325 mL/100 kg seed rate will treat 112 bushels of wheat.

7. **Application Tips:** Uniform coverage is important to obtain optimum results in the field.
8. **How it Works:** Dividend XL RTA is a systemic seed treatment, which controls or suppresses certain seed and soil-borne diseases of wheat
9. **Grazing and Harvest Restrictions:** Do not graze, feed green forage or cut for hay within 55 days of planting.
10. **Toxicity:** Practically non-toxic acute mammalian toxicity. Acute oral LD_{50} (rats) 5,050 mg/kg. Toxic to fish and other aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

Dividend XL RTA

[illegible]

Manufacturer **Novartis**

WARNING POISON

1. **Formulation:** 3.48% FS; 3.21% difenoconazole + 0.27% metalaxyl-M; 2 x 10 L jugs.
2. **Registered Mixes:** None.
3. **Crops:** Wheat (durum, spring and winter varieties).
4. **Fungi Controlled:** Common bunt (seed-borne and soil-borne), dwarf bunt, loose smut, seed-borne septoria, seed-borne fusarium, general seed rots (caused by saprophytic fungi such as *Penicillium* and *Aspergillus*), pythium damping-off, early season control of septoria leaf blotch.

   Fungi Suppressed: Common root rot (*Cochliobolus* spp.) and take-all.
5. **When Used:** Treat seed prior to or at seeding.
6. **How to Apply:**

   With: Dividend XL RTA may be applied to seed with any standard gravity flow or mist-type seed treatment equipment that accurately meters and mixes a flowable seed treatment. Dividend XL RTA may also be used with treat-on-the-go air seeders. The application equipment used must provide uniform coverage of Dividend XL RTA on the seed. Uneven seed coverage may not give the desired level of disease control.

   Rate:

Crop	Disease	mL/100 kg seed
Winter wheat	common bunt[3], dwarf bunt, loose smut, seed-borne fusarium, general seed rots[4], pythium damping off. Suppression of common root rot (*Cochliobolus* spp.) and take-all[2], seed-borne septoria[5] and septoria leaf blotch[1,5]	325 - 650
Spring and durum wheat	common bunt[3], loose smut, seed-borne fusarium, general seed rots[4], pythium damping off. Suppression of common root rot (*Cochliobolus* spp.) and take-all[2], seed-borne septoria[5]	325 - 650

[1] Dividend XL RTA provides control of early season *Septoria* leaf blotch in winter wheat for the first 6 weeks after planting. For full season control, apply a foliar fungicide according to label directions.

[2] Suppression means consistent control at a level that is not optimal but is still of commercial benefit.

[3] Dividend XL RTA controls both seed-borne and soil-borne common bunt.

[4] General seed rots controlled include those caused by saprophytic organisms such as *Penicillium* and *Aspergillus*.

[5] For control of seed-borne septoria and septoria leaf blotch, use the higher rate of 650 mL/100 kg of seed.

Note: One 10 L jug of Dividend XL RTA applied at the 325 mL/100 kg seed rate will treat 112 bushels of wheat.

7. **Application Tips:** Uniform coverage is important to obtain optimum results in the field.
8. **How it Works:** Dividend XL RTA is a systemic seed treatment, which controls or suppresses certain seed- and soil-borne diseases of wheat
9. **Grazing and Harvest Restrictions:** Do not graze, feed green forage or cut for hay within 55 days of planting.
10. **Toxicity:** Practically non-toxic acute mammalian toxicity. Acute oral LD_{50} (rats) 5,050 mg/kg. Toxic to fish and other aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

11. **Precautions, First Aid:** When handling Dividend XL RTA, contaminated equipment or seed treated with Dividend XL RTA, wear long pants, a long-sleeved shirt and chemical resistant gloves. **Keep out of the reach of children.** Harmful if swallowed. Avoid contact with eyes or prolonged contact with skin. Avoid inhalation of vapours or spray mist. Wash hands and face after handling and before eating or smoking. Wear a suitable dust mask when transferring seed to a storage bin. **If swallowed**, repeatedly administer medicinal charcoal in a large volume of water. Never give anything by mouth to an unconscious person. Do not induce vomiting. Obtain prompt medical attention or contact a poison control centre. **If in eyes**, immediately rinse eyes with plenty of water for 15 minutes. Hold eyelids apart to rinse the entire surface of the eyes and lids. Obtain medical attention or contact a poison control centre. **If on skin**, wash thoroughly with soap and water. Remove contaminated clothing and wash prior to re-use. If irritation occurs, obtain medical attention or contact a poison control centre. **If inhaled**, move patient to fresh air. Apply artificial respiration if necessary.
12. **Storage:** Keep product in heated storage prior to use.

Easout PSPT *(thiophanate-methyl)*

Manufacturer **Engage Agro**

1. **Formulation:** Dust; 10%; 10 kg bag.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Fungi Controlled:** Fusarium rot, silver scurf (*Helminthosporium solani*), verticillium wilt. Also aids in control of seed piece decay and black leg infections.
5. **When Used:** Pre-plant potato seed piece treatment. Cut pieces should be treated within 6 hours of cutting. If planting is to be delayed more than 1 - 2 days, treated pieces should be stored for 2 - 3 days in open crates before bagging.
6. **How to Apply:**

   With: Convenient container or by dust attachment over belt.

   Rate: 500 grams per 100 kg of cut seed.

   Water volume: Do **not** add water.
7. **Application Tips:** For optimum control of silver scurf, ensure that seed tubers are completely free of soil.

   Total skin coverage of potato is essential.

   Reduced control can be expected in fields where volunteers from the previous year's crop act as a source of infection.

   Consult your provincial specialist for recommendations.
8. **How it Works:** A systemic and is translocated to the early seedling stage of the potato plant. Under cool, wet conditions, Easout may improve overall emergence due to protecting the tuber and seedling from Fusarium and seed piece decay.
9. **Grazing and Harvest Restrictions:** Due to the nature of the crop, these restrictions would not be applicable.
10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (7,500), Easout (non-toxic).

Easout PSPT (cont'd)

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. If in eyes or on skin, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Keep out of reach of children. Do not contaminate domestic or irrigation water supplies, lakes, streams or ponds.
12. **Storage:** Store in a dry place.

Formalin *(formaldehyde)*

Manufacturer **United Agri Products**

WARNING POISON

1. **Formulation:** Solution; 37%; 4 x 4 L pack, 20 L, 205 L containers.
2. **Registered Mixes:** None.
3. **Crops:** Barley, oats, potatoes, wheat.
4. **Fungi Controlled:**

black scurf/rhizoctonia (potatoes)	covered smut (barley, oats, wheat)
bunt (wheat)	loose smut (oats, except hulless)
common scab (potatoes)	

5. **When Used:** Treat seed before planting. Sow treated seed as soon as possible.
6. **How to Apply:**

With: Small sprayers or sprinklers.

Water volume: Barley, oats, wheat: 300 mL formalin/100 L water (= .3% solution of product).

Grain Seed Treatment: Pile grain on floor and mix with solution until grain is wet. Cover for 4 hours or overnight. If smut balls are present, immerse grain in solution for 5 minutes. Stir and skim off smut balls.

Potato Seed Treatment: Cold Treatment: soak uncut tubers for 2 hours. Hot Treatment: Heat solution to 49 - 52°C and immerse uncut tubers 3 - 4 minutes. Remove and cover for 1 hour. Let dry before cutting and planting.

Rate:

[illegible]	[illegible]	[illegible]
Barley	Covered smut	37
Oats	Smuts (covered, loose)	37
Wheat	Bunt, covered smut	37
		mL formalin/10 L water
Potato tubers	Common scab, black scurf (rhizoctonia)	50 cold or 100 hot

* See *"Water volume"* for solution.

7. **Application Tips:** None.
8. **How it Works:** Formaldehyde is a bactericide and fungicide, used as a soil fumigant and seed treatment, although the latter use is limited by phytotoxicity. (1 mL solution = 1.08 g).
9. **Grazing and Harvest Restrictions:** None.
10. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = formaldyhyde (800). May cause irritation of skin, eyes, nose and throat.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **If inhaled**, remove patient to fresh air; have the patient lie down and keep quiet and warm. Give patient egg white and milk; obtain medical attention. **Keep out of reach of children.**

    Symptoms of poisoning: Skin contact may produce irritation and dermatitis. Ingestion may cause severe abdominal pain, nausea, and vomiting, sometimes followed by stupor. Exposure to vapours may cause burning and stinging of eyes and headache.

12. **Storage:** Keep containers tightly closed away from fire and sparks. Do not freeze. Minimum storage temperature 15°C. Store in a dry, ventilated place away from food and feed.

Foundation *(iprodione + thiram + lindane)*
Foundation Lite *(iprodione + thiram)*

Manufacturer **Aventis Crop Science**

DANGER POISON

1. **Formulation:** Foundation: Liquid Flowable; 99 g/L iprodione + 66 g/L thiram + 495 g/L lindane; Foundation Lite: Liquid; 132 g/L iprodione + 88 g/L thiram; 100 L, 200 L or 1,000 L containers.
2. **Registered Mixes:** Furadan CR-10 and Counter 5G may be mixed with Foundation treated seed. Refer to labels of both products for use recommendations and all safety precautions.

    Foundation Lite: Counter 5G only.
3. **Crops:** Canola, Mustard.
4. **Fungi Controlled:** Damping off rot caused by **Rhizoctonia solani,** seed-borne blackleg and alternaria black spot on emerging seedlings.

    Insects controlled: (Foundation only) Flea beetles.
5. **When Used:** Treat seed once before seeding. Do not store treated seed for more than 6 months. Treated seed stored for more than 6 months should be tested for germination before planting.
6. **How to Apply:** Stir well before using.

    Foundation: The 100 L container treats 3,333 kg of seed. The 200 L container treats 6,666 kg of seed. The 1,000 L container treats 33,333 kg of seed.

    Foundation Lite: 100 L container treats 4,444 kg of seed; 200 L treats 8,888 kg of seed; 1,000 L treats 44,444 kg of seed.

    Rate:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Canola, mustard	**Blackleg, Rhizoctonia, Alternaria**	**Flea beetles**	**750 (suspension)**	**563 mL**

7. **Application Tips:** Roll drum or stir well before using. Thorough seed coverage is required. Treated seed should not require drying after treatment and can be stored or bagged immediately. Treat only the required amount of seed.

Easout PSPT (cont'd)

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. If in eyes or on skin, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Keep out of reach of children. Do not contaminate domestic or irrigation water supplies, lakes, streams or ponds.
12. **Storage:** Store in a dry place.

Formalin *(formaldehyde)*

Manufacturer: United Agri Products

WARNING POISON

1. **Formulation:** Solution; 37%; 4 x 4 L pack, 20 L, 205 L containers.
2. **Registered Mixes:** None.
3. **Crops:** Barley, oats, potatoes, wheat.
4. **Fungi Controlled:**
    - black scurf/rhizoctonia (potatoes)
    - bunt (wheat)
    - common scab (potatoes)
    - covered smut (barley, oats, wheat)
    - loose smut (oats, except hulless)
5. **When Used:** Treat seed before planting. Sow treated seed as soon as possible.
6. **How to Apply:**

With: Small sprayers or sprinklers.

Water volume: Barley, oats, wheat: 300 mL formalin/100 L water (= .3% solution of product).

Grain Seed Treatment: Pile grain on floor and mix with solution until grain is wet. Cover for 4 hours or overnight. If smut balls are present, immerse grain in solution for 5 minutes. Stir and skim off smut balls.

Potato Seed Treatment: Cold Treatment: soak uncut tubers for 2 hours. Hot Treatment: Heat solution to 49 - 52°C and immerse uncut tubers 3 - 4 minutes. Remove and cover for 1 hour. Let dry before cutting and planting.

Rate:

Crop	Disease	mL solution*/25 kg grain
Barley	Covered smut	37
Oats	Smuts (covered, loose)	37
Wheat	Bunt, covered smut	37
		mL formalin/10 L water
Potato tubers	Common scab, black scurf (rhizoctonia)	50 cold or 100 hot

* See "*Water volume*" for solution.

7. **Application Tips:** None.
8. **How it Works:** Formaldehyde is a bactericide and fungicide, used as a soil fumigant and seed treatment, although the latter use is limited by phytotoxicity. (1 mL solution = 1.08 g).
9. **Grazing and Harvest Restrictions:** None.
10. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = formaldyhyde (800). May cause irritation of skin, eyes, nose and throat.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **If inhaled**, remove patient to fresh air; have the patient lie down and keep quiet and warm. Give patient egg white and milk; obtain medical attention. **Keep out of reach of children.**

    Symptoms of poisoning: Skin contact may produce irritation and dermatitis. Ingestion may cause severe abdominal pain, nausea, and vomiting, sometimes followed by stupor. Exposure to vapours may cause burning and stinging of eyes and headache.

12. **Storage:** Keep containers tightly closed away from fire and sparks. Do not freeze. Minimum storage temperature 15 C. Store in a dry, ventilated place away from food and feed.

Foundation *(iprodione + thiram + lindane)*

Foundation Lite *(iprodione + thiram)*

Manufacturer: **Aventis Crop Science**

DANGER POISON

1. **Formulation:** Foundation: Liquid Flowable: 99 g/L iprodione + 66 g/L thiram + 495 g/L lindane; Foundation Lite: Liquid: 132 g/L iprodione + 88 g/L thiram; 100 L, 200 L or 1,000 L containers.
2. **Registered Mixes:** Furadan CR-10 and Counter 5G may be mixed with Foundation treated seed. Refer to labels of both products for use recommendations and all safety precautions.

   Foundation Lite: Counter 5G only.
3. **Crops**: Canola, Mustard.
4. **Fungi Controlled:** Damping off rot caused by **Rhizoctonia solani,** seed-borne blackleg and alternaria black spot on emerging seedlings.

   Insects controlled: (Foundation only) Flea beetles.
5. **When Used**: Treat seed once before seeding. Do not store treated seed for more than 6 months. Treated seed stored for more than 6 months should be tested for germination before planting.
6. **How to Apply**: Stir well before using.

   Foundation: The 100 L container treats 3,333 kg of seed. The 200 L container treats 6,666 kg of seed. The 1,000 L container treats 33,333 kg of seed.

   Foundation Lite: 100 L container treats 4,444 kg of seed; 200 L treats 8,888 kg of seed; 1,000 L treats 44,444 kg of seed.

   Rate:

Crop	Disease	Insect	Foundation mL/25 kg seed	Foundation Lite mL/25 kg seed
Canola, mustard	Blackleg, Rhizoctonia, Alternaria	Flea beetles	750 (suspension)	563 mL

7. **Application Tips:** Roll drum or stir well before using. Thorough seed coverage is required. Treated seed should not require drying after treatment and can be stored or bagged immediately. Treat only the required amount of seed.

8. **How it Works:** Lindane is an organochlorine insecticide that works by ingestion, contact and, to a lesser extent, by fumigant action against soil-dwelling insects. Iprodione fungicide protects against seed-borne blackleg, alternaria and seedling blight caused by **Rhizoctonia solani**. Thiram fungicide protects against soil-borne pathogens. Prevents the above-mentioned diseases from developing and protects against flea beetles for a few days after seedling emergence.
9. **Grazing and Harvest Restrictions:** Do not leave treated seed exposed to birds or other animals.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (200 - 400), lindane (88 - 270). Lindane is toxic to fish, birds and other animals.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.** When handling Foundation and when treating seed or while augering or handling treated seed, work in a well ventilated area and wear a suitable respirator. Wash hands and exposed skin thoroughly after handling the concentrate and after application. Due to unpleasant side effects, alcoholic beverages should be avoided for 24 hours before or after working with Foundation or treated seed.

    For physician: Contains Lindane, a chlorinated hydrocarbon that may be rapidly absorbed following oral ingestion or skin contact. Gastric lavage with saline purgative should be employed; oil purgatives are contraindicated. Symptomatic treatment is recommended, including an appropriate anti-convulsant therapeutic (e.g. diazepam) if required. If reaction with alcohol occurs, treat as disulfiram – alcohol reaction.
12. **Storage:** Do not store in the home or near food or feed. Protect from freezing.

Mertect *(thiabendazole)*

Manufacturer: **Novartis Crop Protection Canada Inc.**

1. **Formulation:** Suspension; 45%; 4 x 4 L pack.
2. **Registered Mixes:** Consult with manufacturer before mixing with other chemicals.
3. **Crops:** Potatoes, sugar beets.
4. **Fungi Controlled: Botrytis, Fusarium, Helminthosporium, Oospora, Penicillium, Phoma, Rhizoctonia.**
5. **When Used:** Once per season.

    Potatoes: Post-harvest control of storage rot in whole potatoes.

    Sugar beets: Foliage treatment for cercospora leaf spot and post-harvest control of storage rot.
6. **How to Apply:**

    With: Aircraft or ground equipment.

    Water volume:

    Potatoes (storage rot): 4 L Mertect/85.1 L water. Spray 2 L of this suspension per 1,000 kg of potatoes.

    Sugar beets (foliar spray): Aircraft: 4 - 16 L/ac. Ground: 40 - 202 L/ac.

    Sugar beets (storage rot): Use sufficient water for complete coverage.

Rate:

Crop	Disease	Quantity
Potatoes	Storage rot	94 mL Mertect/1000 kg potatoes (4 L of Mertect treats 44,550 kg of tubers) or apply 2 L of suspension/ 1,000 kg of tubers.
Sugar beets (foliar)	Cercospora leaf spot	162 - 324 mL/ac Mertect
Sugar beets	Storage rot	13 mL Mertect/1000 kg of sugar beets

7. **Application Tips:** Do not allow suspension to stand without continuous agitation. Potatoes must rotate along the conveyor line to ensure complete coverage. Prior to treating potatoes destined for export, confirm with the proper authorities that treated potatoes will be allowed entry into the importing country.
8. **How it Works:** Thiabendazole is a fungicide which controls **Botrytis, Fusarium, Helminthosporium, Oospora, Penicillium, Phoma and Rhizoctonia fungi**.
9. **Grazing and Harvest Restrictions:** None.
10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = thiabendazole (3,300). May cause skin irritation.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Product contains petroleum distillates.
12. **Storage:** Minimum storage temperature 0°C.

N-M Drill Box/ Dithane M-22 *(maneb)*

Manufacturer: **IPCO/Rohm and Haas**

WARNING POISON

1. **Formulation:**

   Seed Treatments: Powder; 50%. IPCO N-M Drill Box; 1 kg fibre can.

   Foliar spray: Wettable powder; 80%; Dithane M-22; 10 kg bag.
2. **Registered Mixes:** With lindane as dual purpose formulations. Compatible with most insecticides and fungicides but not with Bordeaux mixture or lime.
3. **Crops:** Barley (except Palliser), flax, oats, potatoes, rye, sugar beets, wheat.

Rate:

Crop	Disease	Quantity
Potatoes	Storage rot	94 mL Mertect/1000 kg potatoes (4 L of Mertect treats 44,550 kg of tubers) or apply 2 L of suspension/ 1,000 kg of tubers.
Sugar beets (foliar)	Cercospora leaf spot	162 - 324 mL/ac Mertect
Sugar beets	Storage rot	13 mL Mertect/1000 kg of sugar beets

7. **Application Tips:** Do not allow suspension to stand without continuous agitation. Potatoes must rotate along the conveyor line to ensure complete coverage. Prior to treating potatoes destined for export, confirm with the proper authorities that treated potatoes will be allowed entry into the importing country.
8. **How it Works:** Thiabendazole is a fungicide which controls **Botrytis, Fusarium, Helminthosporium, Oospora, Penicillium, Phoma and Rhizoctonia fungi**.
9. **Grazing and Harvest Restrictions:** None.
10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = thiabendazole (3,300). May cause skin irritation.
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. Product contains petroleum distillates.
12. **Storage:** Minimum storage temperature 0 C.

N-M Drill Box/ Dithane M-22 *(maneb)*

Manufacturer: **IPCO/Rohm and Haas**

WARNING POISON

1. **Formulation:**

   Seed Treatments: Powder: 50%. IPCO N-M Drill Box: 1 kg fibre can.

   Foliar spray: Wettable powder: 80%; Dithane M-22: 10 kg bag.
2. **Registered Mixes:** With lindane as dual purpose formulations. Compatible with most insecticides and fungicides but not with Bordeaux mixture or lime.
3. **Crops:** Barley (except Palliser), flax, oats, potatoes, rye, sugar beets, wheat.

N-M Drill Box, Dithane M-22 (cont'd)

4. Fungi Controlled:

bunt (rye, wheat)
covered smut (barley, oats)
damping-off (flax, sugar beets)
early/late blight (potatoes)
false loose smut (barley)
loose smut (oats)
net blotch (barley)
root rot (cereals, flax)
seedling blight (cereals)
stinking smut (wheat)

5. When Used:

Pre-seeding or Drill Box Treatment: Treat seed before sowing. Seed should be well cured, dry and cleaned before treatment. Do not store treated grain more than 1 year.

Potatoes: Apply early (when plants are 15 cm high) and treat at 7 - 10 day intervals throughout the season. Shorten interval to 5 - 7 days when weather favours disease.

6. How to Apply:

With: Protective equipment, using standard dry seed treatment methodology described.

Pre-seeding Treatment: Apply with any standard dry seed treatment application equipment or the shovel method.

Drill Box Treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform color by the following alternate mixing methods (Do **not** mix with hands):

1. Place and level 1/2 of the seed in drill box and sprinkle 1/2 of the required amount of product uniformly over seed. Mix thoroughly with a paddle. Fill box with seed and sprinkle remaining 1/2 of product over seed, mix again, **or**
2. Dribble the required amount of product into seed as it is poured into drill box. Thoroughly mix with a paddle when drill box is 1/2 full and again when full. **or**
3. Apply through a mechanical dispenser or proportioner that attaches to the auger that conveys seed into the drill box.

Water volume: Potatoes: 325 - 405 L/ac; Heavy vines: 405 - 610 L/ac.

Rate: Potatoes: increase the rates as vines increase in size.

Crop	Disease	Powder g/25 kg seed
Barley (except Palliser)	Net blotch, seedling blight, smuts (covered, false loose), root rot	50 - 66
Flax	Seedling blight, damping-off, root rot	112
Oats	Seeding blight, smuts, root rot	69 - 92
Rye	Bunt, seedling blight, root rot	28 - 43
Wheat	Bunt or stinking smut, seedling blight, root rot	26 - 40

Crop	Disease	g/ac
Potatoes	Early blight, late blight	700 - 910 (80% Dithane M-22)

7. **Application Tips:** Treat only the amount of seed to be sown to avoid the problem of storing treated seed. Slurry treatment not recommended for flax. Calibrate treater prior to treating seed. Use only recommended rates. Lower amounts may not give the desired control. Excessive amounts may cause seed injury.

8. **How it Works:** Maneb is a fungicide, effective against many seedling and foliar diseases.

9. **Grazing and Harvest Restrictions:** Pre-harvest interval (days): potatoes (1). Do not feed treated seed to livestock. Do not expose treated seed to birds and other wildlife.

10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = maneb (6,750).

N-M Drill Box, Dithane M-22 (cont'd)

4. Fungi Controlled:

bunt (rye, wheat)
covered smut (barley, oats)
damping-off (flax, sugar beets)
early/late blight (potatoes)
false loose smut (barley)
loose smut (oats)
net blotch (barley)
root rot (cereals, flax)
seedling blight (cereals)
stinking smut (wheat)

5. When Used:

Pre-seeding or Drill Box Treatment: Treat seed before sowing. Seed should be well cured, dry and cleaned before treatment. Do not store treated grain more than 1 year.

Potatoes: Apply early (when plants are 15 cm high) and treat at 7 - 10 day intervals throughout the season. Shorten interval to 5 - 7 days when weather favours disease.

6. How to Apply:

With: Protective equipment, using standard dry seed treatment methodology described.

Pre-seeding Treatment: Apply with any standard dry seed treatment application equipment or the shovel method.

Drill Box Treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform color by the following alternate mixing methods (Do **not** mix with hands):

1. Place and level 1/2 of the seed in drill box and sprinkle 1/2 of the required amount of product uniformly over seed. Mix thoroughly with a paddle. Fill box with seed and sprinkle remaining 1/2 of product over seed, mix again, **or**
2. Dribble the required amount of product into seed as it is poured into drill box. Thoroughly mix with a paddle when drill box is 1/2 full and again when full, **or**
3. Apply through a mechanical dispenser or proportioner that attaches to the auger that conveys seed into the drill box.

Water volume: Potatoes: 325 - 405 L/ac; Heavy vines: 405 - 610 L/ac.

Rate: Potatoes: increase the rates as vines increase in size.

[illegible]	[illegible]	Powder [illegible]
Barley (except Palliser)	Net blotch, seedling blight, smuts (covered, false loose), root rot	50 - 66
Flax	Seedling blight, damping-off, root rot	112
Oats	Seeding blight, smuts, root rot	69 - 92
Rye	Bunt, seedling blight, root rot	28 - 43
Wheat	Bunt or stinking smut, seedling blight, root rot	26 - 40
[illegible]	[illegible]	[illegible]
Potatoes	Early blight, late blight	700 - 910 (80% Dithane M-22)

7. **Application Tips:** Treat only the amount of seed to be sown to avoid the problem of storing treated seed. Slurry treatment not recommended for flax. Calibrate treater prior to treating seed. Use only recommended rates. Lower amounts may not give the desired control. Excessive amounts may cause seed injury.

8. **How it Works:** Maneb is a fungicide, effective against many seedling and foliar diseases.

9. **Grazing and Harvest Restrictions:** Pre-harvest interval (days): potatoes (1). Do not feed treated seed to livestock. Do not expose treated seed to birds and other wildlife.

10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = maneb (6,750).

11. **Precautions, First Aid:**

    Protective equipment: Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. **If swallowed**, seek medical attention. Take patient to nearest hospital, taking the labelled container with you.

12. **Storage:** Store product in a cool, dry place away from food or feed. Prevent the contents from becoming wet as this will reduce effectiveness and may cause flammable vapours. Keep away from fire and sparks. Stored treated grain should be labelled **"Do not use for food or feed. This seed has been treated with maneb. Poisonous to man and animals." Keep out of reach of children.**

N-M Dual/D-B Green L

(maneb + lindane)
Fungicide – Insecticide

Manufacturer: **IPCO/United Agri Products**

DANGER POISON

1. **Formulation:** Dusts; 37.5% maneb + 18.75% lindane; IPCO NM Dual; 1kg fibre can. D-B Green; Suspension: 323 g/L maneb + 108 g/L lindane; 56.8 L cylinder.
2. **Registered Mixes:** None.
3. **Crops:** Barley (except Palliser), oats, rye, wheat.
4. **Fungi Controlled:**

   bunt (rye, wheat)
   covered smut (barley, oats)
   false loose smut (barley)
   loose smut (oats)
   root rot (cereals)
   seedling blight (cereals)
   stinking smut (wheat)

   Insects controlled: Wireworms.
5. **When Used:** Pre-seeding or Drill Box Treatment: treat seed before sowing. Seed should be well cured, dry and cleaned before treatment. Do not store treated seed more than 1 year.
6. **How to Apply:**

   With: Protective equipment, using standard dry seed treatment methodology described.

   Pre-seeding Treatment: Apply by any standard dry seed treatment application equipment or by the shovel method. Treat only the amount of seed to be used to avoid the problem of storing treated seed.

   Drill Box Treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix powder and seed thoroughly until seed is a uniform color by either of the following alternate mixing methods (Do **not** mix with hands):

   1. Place and level 1/2 of seed in drill box and sprinkle 1/2 of required amount of product uniformly over seed. Mix thoroughly with a stick or paddle. Fill box with seed and sprinkle on remaining 1/2 of product, mix again, **or**
   2. Dribble the required amount of product into the seed as it is poured into the drill box. Mix thoroughly with a stick or paddle when drill box is 1/2 full and again when full, **or**
   3. Apply through a mechanical dispenser or proportioner that attaches to the auger that conveys seed into the drill box.

N-M Dual/D-B Green L (cont'd)

Rate:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Barley (except Palliser)	Smuts (covered, false loose), seedling blight, root rot	Wireworms	65	99
Oats	Smuts, seedling blight, root rot	Wireworms	92	138
Rye	Bunt, seedling blight, root rot	Wireworms	56	65
Wheat	Bunt, stinking smut, seedling blight, root rot	Wireworms	52	78

7. **Application Tips:** Use only recommended rates. Lower amounts may not give the desired control. Excessive amounts may cause seed injury. Avoid very deep seeding and exceptionally early sowing under poor growing conditions for maximum benefits.

8. **How it Works:** Maneb is a protective seed-treatment fungicide. Lindane is an organochlorine insecticide that works by ingestion, contact and, to a lesser extent, by fumigant action against many soil-dwelling insects.

9. **Grazing and Harvest Restrictions:** Do not feed treated grain to livestock. Do not leave treated seed exposed to birds and other wildlife.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = maneb (6,750), lindane (88 - 270). Lindane is toxic to fish, birds and other wildlife.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Lindane: may include nausea, vomiting, hyperirritability, convulsions, coma and other symptoms typical of organochlorine insecticide poisoning. Skin contact with maneb may produce irritation or dermatitis.

    For physician: Lindane is an organochlorine insecticide. Barbiturates may be given to control convulsions. Oxygen may be indicated. Keep patient quiet. Avoid use of morphine and adrenaline.

12. **Storage:** Do not store in or around the home, or near food or feed. Keep away from fire and sparks. **Never** allow product to become wet during storage. This may lead to chemical changes that will reduce the effectiveness of fungicide and produce flammable vapors. Keep container closed when not in use. Treated stored grain should be labelled **"Do not use for food or feed. This seed treated with maneb + lindane. Poisonous to man and animals." Keep out of reach of children.**

Polyram 16D/Polyram DF

(metiram)

Manufacturer: **BASF**

WARNING CORROSIVE

1. **Formulation:** Dry flowable: Polyram DF – 80%; 20 kg bag. Dry flowable: Polyram 16D – 16%; 10 kg box. Polyram 16D is generally used on potato seed treatment; Polyram DF is used as a foliar fungicide.
2. **Registered Mixes:** Benlate 50W, Diazinon, Malathion. Compatible with most commonly used insecticides, adjuvants and fungicides, including Superior Oil Mixtures with Diazinon or Malathion. These should be prepared immediately prior to use and not allowed to stand in the tank. Open bags should be sealed if stored until the following season.
3. **Crops:** Potatoes, sugar beets.
4. **Fungi Controlled:**
   Black leg (potatoes)
   Cercospora leaf spot (sugar beets)
   Early blight (potatoes)
   Fusarium seed piece decay (potatoes)
   Late blight (potatoes)
   Seed-borne common scab (potatoes)
5. **When Used:** See *"How to Apply."*
6. **How to Apply:**

With: Potato seed duster, aircraft, ground equipment.

Water volume: Aircraft: 22 L/ac. Ground: 40 - 80 L/ac.

Pressure: 275 - 345 kPa.

Nozzles: Hollow cones or flat fans recommended.

Rate:

Crop/Disease	Formulation	Dosage/When to Use
Potato Seed Pieces		
Black leg Fusarium decay Scab, common	Polyram 16D	0.45 - 0.65 kg/100 kg seed. Apply to entire surface of seed pieces after cutting. If not planted immediately, provide sufficient ventilation to allow the cut surfaces to dry. May be applied to uncut seed pieces at the same rate of control of seed-borne common scab. If treated whole seed is cut after treatment, a second application is needed to control fusarium seed piece decay and black leg.
Potato (foliar spray)		
Early + late blight	Polyram DF	At 7 - 10 day intervals 0.45 - 0.71 kg/ac until plants cover the row. Then increase to 0.9 kg/ac until tops are killed or use 0.45 - 0.71 kg/ac at 5 - 7 day intervals starting when plants are 15 cm high and continue until killing. When conditions (rain or dew) favour infections, use the shorter intervals in each case.
	Polyram 16D	4.8 - 5.7 kg/ac. Begin treating when plants are 15 cm high and repeat at 7 - 10 day intervals until tops are killed.
Sugar beets		
Cercospora leaf spot	Polyram DF	0.91 kg/ac when disease is noticed. Repeat at 7 - 10 day intervals, depending on weather conditions.

7. **Application Tips:** See *"How to Apply."*
8. **How it Works:** A contact and protectant fungicide.

N-M Dual/D-B Green L (cont'd)

Rate:

Crop	Disease	Insect	Powder g/25 kg seed	D-B Green mL/25 kg seed
Barley (except Palliser)	Smuts (covered, false loose), seedling blight, root rot	Wireworms	65	99
Oats	Smuts, seedling blight, root rot	Wireworms	92	138
Rye	Bunt, seedling blight, root rot	Wireworms	56	65
Wheat	Bunt, stinking smut, seedling blight, root rot	Wireworms	52	78

7. **Application Tips:** Use only recommended rates. Lower amounts may not give the desired control. Excessive amounts may cause seed injury. Avoid very deep seeding and exceptionally early sowing under poor growing conditions for maximum benefits.

8. **How it Works:** Maneb is a protective seed-treatment fungicide. Lindane is an organochlorine insecticide that works by ingestion, contact and, to a lesser extent, by fumigant action against many soil-dwelling insects.

9. **Grazing and Harvest Restrictions:** Do not feed treated grain to livestock. Do not leave treated seed exposed to birds and other wildlife.

10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = maneb (6,750), lindane (88 - 270). Lindane is toxic to fish, birds and other wildlife.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention.

    Symptoms of poisoning: Lindane: may include nausea, vomiting, hyperirritability, convulsions, coma and other symptoms typical of organochlorine insecticide poisoning. Skin contact with maneb may produce irritation or dermatitis.

    For physician: Lindane is an organochlorine insecticide. Barbiturates may be given to control convulsions. Oxygen may be indicated. Keep patient quiet. Avoid use of morphine and adrenaline.

12. **Storage:** Do not store in or around the home, or near food or feed. Keep away from fire and sparks. **Never** allow product to become wet during storage. This may lead to chemical changes that will reduce the effectiveness of fungicide and produce flammable vapors. Keep container closed when not in use. Treated stored grain should be labelled **"Do not use for food or feed. This seed treated with maneb + lindane. Poisonous to man and animals." Keep out of reach of children.**

Polyram 16D/Polyram DF

(metiram)

Manufacturer: BASF

WARNING CORROSIVE

1. **Formulation:** Dry flowable: Polyram DF – 80%; 20 kg bag. Dry flowable: Polyram 16D – 16%; 10 kg box. Polyram 16D is generally used on potato seed treatment; Polyram DF is used as a foliar fungicide.
2. **Registered Mixes:** Benlate 50W, Diazinon, Malathion. Compatible with most commonly used insecticides, adjuvants and fungicides, including Superior Oil Mixtures with Diazinon or Malathion. These should be prepared immediately prior to use and not allowed to stand in the tank. Open bags should be sealed if stored until the following season.
3. **Crops:** Potatoes, sugar beets.
4. **Fungi Controlled:**

   Black leg (potatoes)
   Cercospora leaf spot (sugar beets)
   Early blight (potatoes)
   Fusarium seed piece decay (potatoes)
   Late blight (potatoes)
   Seed-borne common scab (potatoes)
5. **When Used:** See *"How to Apply."*
6. **How to Apply:**

   With: Potato seed duster, aircraft, ground equipment.

   Water volume: Aircraft: 22 L/ac. Ground: 40 - 80 L/ac.

   Pressure: 275 - 345 kPa.

   Nozzles: Hollow cones or flat fans recommended.

   Rate:

Crop/Disease	Formulation	Quantity/When to Use
Potato Seed Pieces		
Black leg Fusarium decay Scab, common	Polyram 16D	0.45 - 0.65 kg/100 kg seed. Apply to entire surface of seed pieces after cutting. If not planted immediately, provide sufficient ventilation to allow the cut surfaces to dry. May be applied to uncut seed pieces at the same rate of control of seed-borne common scab. If treated whole seed is cut after treatment, a second application is needed to control fusarium seed piece decay and black leg.
Potato (foliar spray)		
Early + late blight	Polyram DF	At 7 - 10 day intervals 0.45 - 0.71 kg/ac until plants cover the row. Then increase to 0.9 kg/ac until tops are killed or use 0.45 - 0.71 kg/ac at 5 - 7 day intervals starting when plants are 15 cm high and continue until killing. When conditions (rain or dew) favour infections, use the shorter intervals in each case.
	Polyram 16D	4.8 - 5.7 kg/ac. Begin treating when plants are 15 cm high and repeat at 7 - 10 day intervals until tops are killed.
Sugar beets		
Cercospora leaf spot	Polyram DF	0.91 kg/ac when disease is noticed. Repeat at 7 - 10 day intervals, depending on weather conditions.

7. **Application Tips:** See *"How to Apply."*
8. **How it Works:** A contact and protectant fungicide.

Polyram16D/Polyram DF (cont'd)

9. **Grazing and Harvest Restrictions:** Do not feed treated forage to livestock. Do not apply when environmental conditions may cause drift from the treatment area. Harvest intervals (days): carrots (5), celery (14), potatoes (1), sugar beets (21), tomatoes (7).
10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (greater than 10,000).
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**
12. **Storage:** Store in a cool, dry, ventilated place. Do not allow product to become wet or overheated as this will reduce its effectiveness and may create flammable vapours.

Premiere Plus

(thiram + thiabendazole + lindane)

Fungicide – Insecticide

Manufacturer: **Zeneca Agro**

DANGER POISON

1. **Formulation:** Flowable Liquid; 4.8% thiram+1.6% thiabendazole+40% lindane; 2 x 10 L, 100 L drum "returnable."
2. **Registered Mixes:** None.
3. **Crops:** Canola, mustard.
4. **Fungi Controlled:** Alternaria Black Spot (seed-borne), blackleg (seed-borne), seedling blight, pre-emergence damping-off and seed decay.

   Insects controlled: Flea beetles.
5. **When Used:** Treat seed once before sowing. Treated seed should be tested for germination if stored for more than 4 months.
6. **How to Apply:** Roll drum or stir before using. On-farm treatment with a continuous flow dripolator device or have custom treated. Premiere can be applied with most batch, continuous and cement mixer treaters.

   Rate: 700 mL/25 kg seed.
7. **Application Tips:** Roll drum or stir well before using. Ensure thorough seed coverage. Treated seed does not require drying prior to bagging or storage. Treated seed should be handled as little as possible after treating.
8. **How it Works:** Thiram is a protective fungicide on the seed surface. Thiabendazole (TBZ) is a systemic fungicide that penetrates the seed to control diseases of the seed and seedling. Lindane is an insecticide that acts by ingestion, contact and, to a lesser extent, by fumigant action. Prevents all above mentioned diseases from developing and protects against flea beetles during early crop emergence.

   Expected results: Prevents diseases from developing and protects against flea beetles during early crop emergence.

   Movement in soil: Does not move in the soil.
9. **Grazing and Harvest Restrictions:** Do not leave treated seed exposed to birds or other animals.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg)= lindane (88 - 270), thiram tech (350), thiabendazole (3,300). Lindane is toxic to fish, birds and other animals.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**

    Symptoms of poisoning: Lindane: may include nausea, vomiting, hyperirritability, convulsions, coma and other symptoms typical of organochlorine insecticide poisoning. Skin contact with fungicides may produce irritation or dermatitis.

    For physician: Lindane is an organochlorine insecticide. Barbiturates (e.g., diazepam) may be given to control convulsions. Oxygen may be indicated. Keep patient quiet. Avoid use of morphine and adrenaline.

12. **Storage:** Do not store in the home or near food or feed. Protect from frost (freezing).

Ridomil Gold MZ 68WP

(metalaxyl + mancozeb)

Manufacturer **Novartis Crop Protection**

WARNING POISON

1. **Formulation:** Wettable powder; 8% metalaxyl + 64% mancozeb; 4% metalaxyl + 64% mancozeb; 6 x 4 kg.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes, lettuce, onions.
4. **Fungi Controlled:** Late blight and late blight tuber rot, early blight, downy mildew in onions and head lettuce.

    Fungi Suppressed: Pythium leak and pink rot in potatoes.

5. **When Used:** Ridomil MZ must be applied before the outbreak of disease. Apply 3 applications in sufficient water to ensure thorough coverage of foliage. Start application early – the first application should be applied before the leaves of the plants touch in the potato row. Apply a second and third application of Ridomil MZ at 10 - 14 day intervals. Apply a contact fungicide recommended for control of late blight, 5 - 7 days after each Ridomil MZ application. Following the final Ridomil MZ application, apply a contact fungicide recommended for late blight control at the recommended rate and interval to the end of the season.

    Use limitations: To minimize the risk of resistance, do not use Ridomil MZ more than three times per season. Discontinue use when potato vines start to look mature. Do not tank mix Ridomil MZ with a top-killer.

6. **How to Apply:**

    With: Aircraft or ground equipment.

    Rate: 1 kg/ac.

    Water volume:
    Ground: sufficient water to ensure thorough coverage of foliage.
    Air: minimum of 20 L of water per acre.

    Pressure: 275 kPa.

    Nozzles: Flat fan. Spray screens should be no finer than 50 mesh. For aerial application, adjust nozzles to provide a medium droplet size of 200 - 400 microns.

    Sprays: Do not let tank contents stand for prolonged periods without agitation. Ensure by-pass line discharges at the bottom of the tank to minimize foaming.

7. **Application Tips:** Ridomil MZ should be applied as part of a preventative disease management program. Cultural practices to minimize the sources of disease should be used as well as early preventative applications of fungicides. Under severe late blight conditions, the shorter 10-day interval is recommended. When changing from Ridomil MZ to a contact fungicide, apply within 5 - 7 days of the last Ridomil MZ application.
8. **How it Works:** Ridomil MZ is a combination of a systemic and contact fungicide. It has both preventative and curative activity against fungi of the order Peronosporales – this includes the late blight fungus.
9. **Grazing and Harvest Restrictions:** Potato vines are naturally poisonous and should **never** be fed to livestock. Ridomil MZ should not be applied within 14 days of lettuce harvest or 7 days of onion harvest.
10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg): mancozeb (8,000); metalaxyl (669).
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the undiluted pesticide (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention. **If swallowed**, seek medical attention. **Keep out of reach of children.**

    Symptoms of poisoning: Irritation of eyes, skin or respiratory tract; vomiting, diarrhea, apathy, circulatory problems. Some individuals may develop an allergy. Prolonged or repeated overexposure to dust may cause apathy, loss of appetite or weakness.

    For physician: There is no specific antidote for this product. If ingested, induce emesis or initiate gastric lavage. Treat symptomatically.
12. **Storage:** Dry, heated storage above 0°C. Keep away from sources of heat above 40°C. Keep containers closed when not in use.

Ronilan EG *(vinclozolin)*

Manufacturer **BASF**

1. **Formulation:** Extruded Granule; 50%;12 kg box [5 x (6 x 0.4 kg water soluble PVA bags)].
2. **Registered Mixes:** Lorsban 4E, Pyrinex 480EC.
3. **Crops:** Canola, dry beans, strawberries.
4. **Fungi Controlled:** Sclerotinia Stem Rot (white mold), gray mold (Botrytis cinerea).
5. **When Used:**

    Canola:

    Single application (300 - 400 g/ac): One treatment at 20 - 50% flowering. This will normally be about 4 - 12 days after beginning of flowering.

    Split application: Apply first application (200 g/ac) at early bloom (20 - 30% bloom) with a second application (200 g/ac) 7 days later at full bloom (50%) if the disease persists or weather conditions are favourable for disease development.

    Dry beans: One application at 30 - 50% bloom followed by a second application 7 - 14 days later if disease pressure is high.

    Strawberries: First application at 10% bloom and last before end of blooming. Maximum 4 applications per season.

M121

IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

THE PAGES WHICH FOLLOW HAVE BEEN FILMED TWICE IN ORDER TO OBTAIN THE BEST REPRODUCTIVE QUALITY

USERS SHOULD CONSULT ALL THE PAGES REPRODUCED ON THE FICHE IN ORDER TO OBTAIN A COMPLETE READING OF THE TEXT.

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6. How to Apply:

With: Aircraft or ground equipment.

Water volume: Air: 16 L/ac, ground: 45 - 90 L/ac. Strawberries: 405 L/ac.

Canola: Air or ground.

Beans, strawberries: Ground only.

Pressure: 275 kPa. Strawberries: 425 - 850 kPa.

Rate:

[illegible]	[illegible]	[illegible]
Canola - single application	Sclerotinia Stem Rot	300 - 400*
Canola - split application		200**
Dry beans	white mold	400 - 600
Strawberries	gray mold	800

* Use the high rate (400 g/ac) where conditions are extremely favourable for development of disease (heavy crop canopy, high humidity and/or excessive rainfall.

** Apply first application (200 mL/ac) at early bloom (20 - 30%) with a second application (200 mL/ac) 7 days later at full bloom if the disease persists, or if weather conditions are favorable for disease development.

7. Application Tips: Thorough coverage of plant parts prior to infection is essential for effective disease control. Ensure continuous agitation in the spray tank until the spray solution is sprayed out.

Ronilan EG should be applied using standard aerial equipment or ground equipment and practices. Treat when wind is less than 8 kilometers per hour when applying by air. Avoid handling the water soluble bags with wet gloves or placing on wet surfaces.

8. How it Works: Ronilan EG is a contact protectant fungicide with some early eradicant properties that will control infections that occurred up to 36 hours prior to application. Contact activity means all the fungicide remains on the petal surfaces where the disease initially develops and the fungicidal activity is not diluted by movement to other plant tissues that have no impact on the development of sclerotinia. It acts by preventing the germination of spores and will arrest the development of germinated spores.

Effects of rainfall: Do not apply if rain is imminent.

9. Grazing and Harvest Restrictions: Do not allow livestock to graze on Ronilan treated plants. Do not apply within 45 days of harvest for dry beans or 40 days of harvest for canola.

10. Toxicity: Very low mammalian toxicity, LD_{50} (rats) > 5000 mg/kg.

Warning: Animal studies have demonstrated that the active ingredient in this product can produce adverse effects on the reproductive system and on the developing fetus. Workers, especially women of childbearing age, should be careful when handling this product. Occupational exposure will be reduced by strict adherence to the handling precautions and use directions provided.

11. Precautions, First Aid: Refer to label for guidelines on protective clothing. **In case of eye contact**, flush immediately with flowing water for at least 15 minutes and consult a physician if irritation develops. **In case of skin contact**, wash with soap and water. Remove contaminated clothing and launder before reuse. Consult a physician if irritation develops. **If swallowed**, give two (2) glasses of water, **Induce Vomiting** and consult a physician immediately. **If inhaled**, remove person to fresh air. Assist breathing if necessary. Consult a physician immediately.

12. Storage: Store in a cool, dry, well-ventilated space away from feeds and foods. Freezing will not affect Ronilan EG.

6. **How to Apply:**

   With: Aircraft or ground equipment.

   Water volume: Air: 16 L/ac, ground: 45 - 90 L/ac. Strawberries: 405 L/ac.

   Canola: Air or ground.

   Beans, strawberries: Ground only.

   Pressure: 275 kPa. Strawberries: 425 - 850 kPa.

   Rate:

Crop	Disease	g/ac
Canola - single application	Sclerotinia Stem Rot	300 - 400*
Canola - split application		200**
Dry beans	white mold	400 - 600
Strawberries	gray mold	800

* Use the high rate (400 g/ac) where conditions are extremely favourable for development of disease (heavy crop canopy, high humidity and/or excessive rainfall.

** Apply first application (200 mL/ac) at early bloom (20 - 30%) with a second application (200 mL/ac) 7 days later at full bloom if the disease persists, or if weather conditions are favorable for disease development.

7. **Application Tips:** Thorough coverage of plant parts prior to infection is essential for effective disease control. Ensure continuous agitation in the spray tank until the spray solution is sprayed out.

   Ronilan EG should be applied using standard aerial equipment or ground equipment and practices. Treat when wind is less than 8 kilometers per hour when applying by air. Avoid handling the water soluble bags with wet gloves or placing on wet surfaces.

8. **How it Works:** Ronilan EG is a contact protectant fungicide with some early eradicant properties that will control infections that occurred up to 36 hours prior to application. Contact activity means all the fungicide remains on the petal surfaces where the disease initially develops and the fungicidal activity is not diluted by movement to other plant tissues that have no impact on the development of sclerotinia. It acts by preventing the germination of spores and will arrest the development of germinated spores.

   Effects of rainfall: Do not apply if rain is imminent.

9. **Grazing and Harvest Restrictions:** Do not allow livestock to graze on Ronilan treated plants. Do not apply within 45 days of harvest for dry beans or 40 days of harvest for canola.

10. **Toxicity:** Very low mammalian toxicity, LD_{50} (rats) > 5000 mg/kg.

    Warning: Animal studies have demonstrated that the active ingredient in this product can produce adverse effects on the reproductive system and on the developing fetus. Workers, especially women of childbearing age, should be careful when handling this product. Occupational exposure will be reduced by strict adherence to the handling precautions and use directions provided.

11. **Precautions, First Aid:** Refer to label for guidelines on protective clothing. **In case of eye contact**, flush immediately with flowing water for at least 15 minutes and consult a physician if irritation develops. **In case of skin contact**, wash with soap and water. Remove contaminated clothing and launder before reuse. Consult a physician if irritation develops. **If swallowed**, give two (2) glasses of water, **Induce Vomiting** and consult a physician immediately. **If inhaled**, remove person to fresh air. Assist breathing if necessary. Consult a physician immediately.

12. **Storage:** Store in a cool, dry, well-ventilated space away from feeds and foods. Freezing will not affect Ronilan EG.

Rovral *(iprodione)*

CAUTION POISON

Manufacturer: Aventis Crop Science

1. **Formulation:** Wettable powder: 50%; 1 kg, 8 kg bags. Flowable; Rovral flo; 240 g/L; 2 x 8 L pack.
2. **Registered Mixes:** Addition of 405 g non-ionic wetter is recommended for improved fungicide performance with the wettable powder only.
3. **Crops:** Beans (kidney, snap, white) (Rovral Wettable Powder only), canola.
4. **Fungi Controlled:** Botrytis diseases, sclerotinia stem rot, sclerotinia white mold, alternaria.
5. **When Used:**

   Beans: Treatment prior to the presence of disease is preferable; however, Rovral is still effective if applied at the initial sign of infection, when less than 5% of the plants are showing sclerotinia white mold. Apply when beans are in the 25 - 75% bloom stage.

   Canola: Rovral flo

   Single application (840 - 1240 mL/ac): For Sclerotinia stem rot control and Alternaria suppression, apply when crop is at the 20 - 30% bloom stage. Infection normally occurs in July. For Alternaria control, apply 840 mL/ac at the early green pod stage.*

   Split application: For Alternaria control, apply first application (420 mL/ac) at the 20 - 30% bloom stage with a second application (420 mL/ac) at the early green pod stage.*

   ***Early green pod stage:** Almost all canola pods are fully formed and still green with only a few flowers or undeveloped pods remaining at the top of the plant.
6. **How to Apply:**

   With: Aircraft or ground equipment.

   Water volume: Beans 18 L/ac (air); 121 L/ac (ground). Canola 18 L/ac (air); 40 L/ac (ground).

   Rate:

Crop	Disease	W.P. g/ac	Flo mL/ac
Canola - single application	**Sclerotinia and Alternaria**	400 - 600	840 - 1240*
Canola - split application	**Alternaria**	NR	420**
Beans (white, kidney, snap)	**Sclerotinia and Botrytis**	400 - 600	NR

* Higher rate for fields with a history of heavy disease pressure or with dense crop stands.

** Apply first application (420 mL/ac) at early bloom (20 - 30%) with a second application (420 mL/ac) at early green pod stage if the disease persists or if weather conditions are favorable for disease development.

7. **Application Tips:** When disease is actively growing in beans, the infection may quickly exceed the point where 5% of plants show mold. Spray mixture should be used on the day prepared. Good spray coverage is essential.
8. **How it Works:** Rovral is a protective and eradicant fungicide. Prevents disease infestation during the mid-flowering period and thus protects against major yield losses.

   Effects of rainfall: Do not spray in heavy dew or when rain is imminent.
9. **Grazing and Harvest Restrictions:** Observe a pre-harvest interval of 38 days.
10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = iprodione (3,500). Very low toxicity to bees.

Rovral *(iprodione)*

Manufacturer: **Aventis Crop Science**

CAUTION POISON

1. **Formulation:** Wettable powder; 50%; 1 kg, 8 kg bags. Flowable; Rovral flo; 240 g/L; 2 x 8 L pack.
2. **Registered Mixes:** Addition of 405 g non-ionic wetter is recommended for improved fungicide performance with the wettable powder only.
3. **Crops:** Beans (kidney, snap, white) (Rovral Wettable Powder only), canola.
4. **Fungi Controlled:** Botrytis diseases, sclerotinia stem rot, sclerotinia white mold, alternaria.
5. **When Used:**

   Beans: Treatment prior to the presence of disease is preferable; however, Rovral is still effective if applied at the initial sign of infection, when less than 5% of the plants are showing sclerotinia white mold. Apply when beans are in the 25 - 75% bloom stage.

   Canola: Rovral flo

   Single application (840 - 1240 mL/ac): For Sclerotinia stem rot control and Alternaria suppression, apply when crop is at the 20 - 30% bloom stage. Infection normally occurs in July. For Alternaria control, apply 840 mL/ac at the early green pod stage.*

   Split application: For Alternaria control, apply first application (420 mL/ac) at the 20 - 30% bloom stage with a second application (420 mL/ac) at the early green pod stage.*

   ***Early green pod stage:** Almost all canola pods are fully formed and still green with only a few flowers or undeveloped pods remaining at the top of the plant.
6. **How to Apply:**

   With: Aircraft or ground equipment.

   Water volume: Beans 18 L/ac (air); 121 L/ac (ground). Canola 18 L/ac (air); 40 L/ac (ground).

   Rate:

[illegible]	Disease	[illegible]	[illegible]
Canola - single application	Sclerotinia and Alternaria	400 - 600	840 - 1240*
Canola - split application	Alternaria	NR	420**
Beans (white, kidney, snap)	Sclerotinia and Botrytis	400 - 600	NR

* Higher rate for fields with a history of heavy disease pressure or with dense crop stands.
** Apply first application (420 mL/ac) at early bloom (20 - 30%) with a second application (420 mL/ac) at early green pod stage if the disease persists or if weather conditions are favorable for disease development.

7. **Application Tips:** When disease is actively growing in beans, the infection may quickly exceed the point where 5% of plants show mold. Spray mixture should be used on the day prepared. Good spray coverage is essential.
8. **How it Works:** Rovral is a protective and eradicant fungicide. Prevents disease infestation during the mid-flowering period and thus protects against major yield losses.

   Effects of rainfall: Do not spray in heavy dew or when rain is imminent.
9. **Grazing and Harvest Restrictions:** Observe a pre-harvest interval of 38 days.
10. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = iprodione (3,500). Very low toxicity to bees.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. A mild eye irritant. **If swallowed**, seek medical attention. **Keep out of reach of children.**
12. **Storage:** Store flowable above 0°C.

Tattoo C *(propamocarb hydrochloride + chlorothalonil)*

[illegible]

Manufacturer: **Aventis Crop Science**

1. **Formulation:** Suspension Concentrate; 375 g/L Propamocarb HCl + 375 g/L Chlorothalonil; 10 L jug.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Fungi Controlled:** Late blight.
5. **When Used:** Use a maximum of 3 applications of Tattoo C per growing season as a foliar spray in a preventative program for control of late blight in potatoes. Begin applications when conditions are favorable for disease, but before infection, and continue on 7 - 14 day intervals until the threat of disease is over. Use the 7-day interval when the risk and conditions for disease are high. When applying Tattoo C on the longer spray interval (10 - 14 days), alternate with an application of a contact fungicide midway between Tattoo C applications.
6. **How to Apply**:

   With: Ground equipment.

   Rate: 1.1 L/ac.

   Water volume: Apply in 80 - 120 L of water per acre. Ensure thorough coverage of the potato foliage.

   Sprays: Do not allow spray mixture to remain in tank overnight or for long periods during the day without agitation.

   Mixing instructions: Add one-half of the required amount of water to the spray or mixing tank and start agitation. Add the required quantity of Tattoo C to the water and complete filling with water. Maintain agitation throughout spraying.
7. **Application Tips:** Thorough spray coverage of all plant material (particularly lower stems) is essential to attain optimum systemic activity. If multiple fungicide applications are required, rotation with other fungicide products is recommended. Where possible, Tattoo C should be applied in alternation with a fungicide having a different mode of action. Treatment with any product containing chlorothalonil must be separated by a minimum of 7 days.
8. **How it Works:** Tattoo C is a fungicide that combines the systemic action of propamocarb hydrochloride with the contact activity of chlorothalonil to give protection against late blight of potatoes. Propamocarb hydrochloride only moves in an upward direction in the potato plant, so it is essential to ensure coverage of the lower portions of the plant.
9. **Grazing and Harvest Restrictions:** Do not apply within 7 days of harvest. Do not feed treated crops to livestock.
10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg): propamocarb hydrochloride = 2000 - 8550; chlorothalonil = 4200.

Tattoo C (cont'd)

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**

    Precaution: Do not re-enter treated areas within 48 hours after treatment. If required, individuals may re-enter treated areas within 48 hours for short-term tasks not involving hand labour provided that 4 hours have passed since application and that long pants and a long-sleeved shirt are worn.

    For physician: Probable mucosal damage may contraindicate the use of gastric lavage. Medical personnel should contact Aventis Crop Science's Hazard Information Services at 1-800-228-5635, ext. 201.

12. **Storage:** Cannot be stored below freezing. Keep away from fire or open flame or other sources of heat. If stored for 1 year or longer, shake well before using.

Thiram 75WP *(thiram)*

Manufacturer **Gustafson**

WARNING POISON

1. **Formulation:** Wettable powder; 75%; 5 kg, 25 kg bag.
2. **Registered Mixes:** None.
3. **Crops:** Alfalfa, beans (dry, snap), corn (sweet), grasses, mustard, peas, safflowers, soybeans, sugar beets.
4. **Fungi Controlled:** Damping-off, seed decay, seedling blight (corn, beans, grasses, mustard, peas, soybeans, sugar beets). Verticillium wilt (alfalfa).
5. **When Used:** Pre-seeding or Drill box treatment: treat seed before sowing. Seed should be well cured, dry and cleaned before treatment.
6. **How to Apply:**

    With: Protective equipment, using standard dry seed treatment methodology described.

    Pre-seeding Treatment: Apply with any standard dry seed treatment application equipment or the shovel method. Drill box treatment: at the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform color by the following alternate mixing methods. (**Do not** mix with hands):

    1. Place and level 1/2 of the seed in drill box and sprinkle 1/2 of the required amount of product uniformly over seed. Mix thoroughly with a paddle. Fill box with seed and sprinkle remaining 1/2 of product over seed, mix again, **or**
    2. Dribble the required amount of product into seed as it is poured into drill box. Thoroughly mix with a paddle when drill box is 1/2 full and again when full, **or**
    3. Apply through a mechanical dispenser or proportioner that attaches to the auger that conveys seed into the drill box.

    Rate:

Crop	Disease	Powder (g/25 kg seed)
Alfalfa	Verticillium wilt	90
Grasses, mustard, sugar beet	Damping-off, seed decay, seedling blight	90
Bean (dry, snap), pea, soybean	Damping-off, seed decay, seedling blight	25 - 35
Corn (sweet)	Damping-off, seed decay, seedling blight	55
Safflower	Damping-off, seed decay, seedling blight	50

Water volume for Thiram 75WP:

Slurry treatment on alfalfa and peas: Pre-mix Thiram 75WP in water as indicated below and apply with commercial seed treating equipment.

kg Thiram 75WP	[illegible]	[illegible]	[illegible]
1.5	5	416	1070 - 1498

7. **Application Tips:** Mustard: mix powder and seed in drill box. Simultaneous treatment with an insecticide for control of flea beetles is recommended (also see the manual sections on carbofuran and terbufos).
8. **How it Works:** Thiram is a protective fungicide applied as a seed-treatment powder.
9. **Grazing and Harvest Restrictions:** Do not feed treated seed to livestock. Do not expose treated seed to birds and other wildlife.

   Seed Treatment: Do not graze for 4 weeks after planting.
10. **Toxicity:** Low mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = thiram (780 - 865), product (800 - 3100). May irritate eyes, nose, throat or skin. May cause allergenic exzema in sensitive individuals.
11. **Precautions, First Aid:** Consumption of alcohol 24 hours before and after working with thiram or thiram-treated seed may cause sweating, flushing and nausea. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.** Take labelled container with you.
12. **Storage:** Store in a cool, dry, ventilated place away from food or feed. Keep away from fire or sparks. Stored treated grain should be labelled: **Do not use for food or feed. This seed has been treated with thiram. Poisonous to man and animals. Keep out of reach of children.**

Tilt *(propiconazole)*

Manufacturer **Novartis Crop Protection**

CAUTION POISON

1. **Formulation:** Emulsifiable Concentrate; 250 g/L; 2 x 5 L jugs; 4 x 5 L jugs.
2. **Registered Mixes:** In wheat and barley only: 2,4-D amine, MCPA amine, Buctril M, Pardner. In wheat, barley and oats: Liquid Nitrogen (at 4.05 kg/ac or less).
3. **Crops:** Barley, canola, oats, wheat (winter, Canada prairie spring, soft white spring, hard red spring, durum).
4. **Fungi Controlled:**

Barley	**Wheat**	**Oat**	**Canola**
leaf rust	glume blotch	crown rust	blackleg
net blotch	leaf rust	septoria leaf blotch	
powdery mildew	powdery mildew		
scald	septoria leaf spot		
septoria leaf spot	stem rust		
spot blotch	stripe rust		
stem rust	tan spot		

Tattoo C (cont'd)

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**

    Precaution: Do not re-enter treated areas within 48 hours after treatment. If required, individuals may re-enter treated areas within 48 hours for short-term tasks not involving hand labour provided that 4 hours have passed since application and that long pants and a long-sleeved shirt are worn.

    For physician: Probable mucosal damage may contraindicate the use of gastric lavage. Medical personnel should contact Aventis Crop Science's Hazard Information Services at 1-800-228-5635, ext. 201.

12. **Storage:** Cannot be stored below freezing. Keep away from fire or open flame or other sources of heat. If stored for 1 year or longer, shake well before using.

Thiram 75WP *(thiram)*

Manufacturer: Gustafson

WARNING POISON

1. **Formulation:** Wettable powder; 75%; 5 kg, 25 kg bag.
2. **Registered Mixes:** None.
3. **Crops:** Alfalfa, beans (dry, snap), corn (sweet), grasses, mustard, peas, safflowers, soybeans, sugar beets.
4. **Fungi Controlled:** Damping-off, seed decay, seedling blight (corn, beans, grasses, mustard, peas, soybeans, sugar beets). Verticillium wilt (alfalfa).
5. **When Used:** Pre-seeding or Drill box treatment: treat seed before sowing. Seed should be well cured, dry and cleaned before treatment.
6. **How to Apply:**

    With: Protective equipment, using standard dry seed treatment methodology described.

    Pre-seeding Treatment: Apply with any standard dry seed treatment application equipment or the shovel method. Drill box treatment: at the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform color by the following alternate mixing methods. (**Do not** mix with hands):

    1. Place and level 1/2 of the seed in drill box and sprinkle 1/2 of the required amount of product uniformly over seed. Mix thoroughly with a paddle. Fill box with seed and sprinkle remaining 1/2 of product over seed, mix again, **or**
    2. Dribble the required amount of product into seed as it is poured into drill box. Thoroughly mix with a paddle when drill box is 1/2 full and again when full, **or**
    3. Apply through a mechanical dispenser or proportioner that attaches to the auger that conveys seed into the drill box.

    Rate:

Crop	Disease	Powder (g/25 kg seed)
Alfalfa	Verticillium wilt	90
Grasses, mustard, sugar beet	Damping-off, seed decay, seedling blight	90
Bean (dry, snap), pea, soybean	Damping-off, seed decay, seedling blight	25 - 35
Corn (sweet)	Damping-off, seed decay, seedling blight	55
Safflower	Damping-off, seed decay, seedling blight	50

Water volume for Thiram 75WP:

Slurry treatment on alfalfa and peas: Pre-mix Thiram 75WP in water as indicated below and apply with commercial seed treating equipment.

kg Thiram 75WP	L of water	Alfalfa, kg of seed treated	Peas, kg of seed treated
1.5	5	416	1070 - 1498

7. **Application Tips:** Mustard: mix powder and seed in drill box. Simultaneous treatment with an insecticide for control of flea beetles is recommended (also see the manual sections on carbofuran and terbufos).
8. **How it Works:** Thiram is a protective fungicide applied as a seed-treatment powder.
9. **Grazing and Harvest Restrictions:** Do not feed treated seed to livestock. Do not expose treated seed to birds and other wildlife.

   Seed Treatment: Do not graze for 4 weeks after planting.
10. **Toxicity:** Low mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = thiram (780 - 865), product (800 - 3100). May irritate eyes, nose, throat or skin. May cause allergenic exzema in sensitive individuals.
11. **Precautions, First Aid:** Consumption of alcohol 24 hours before and after working with thiram or thiram-treated seed may cause sweating, flushing and nausea. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.** Take labelled container with you.
12. **Storage:** Store in a cool, dry, ventilated place away from food or feed. Keep away from fire or sparks. Stored treated grain should be labelled: **Do not use for food or feed. This seed has been treated with thiram. Poisonous to man and animals. Keep out of reach of children.**

Tilt *(propiconazole)*

Manufacturer: **Novartis Crop Protection**

CAUTION POISON

1. **Formulation:** Emulsifiable Concentrate; 250 g/L; 2 x 5 L jugs; 4 x 5 L jugs.
2. **Registered Mixes:** In wheat and barley only: 2,4-D amine, MCPA amine, Buctril M, Pardner. In wheat, barley and oats: Liquid Nitrogen (at 4.05 kg/ac or less).
3. **Crops:** Barley, canola, oats, wheat (winter, Canada prairie spring, soft white spring, hard red spring, durum).
4. **Fungi Controlled:**

Barley	Wheat	Oat	Canola
leaf rust	glume blotch	crown rust	blackleg
net blotch	leaf rust	septoria leaf blotch	
powdery mildew	powdery mildew		
scald	septoria leaf spot		
septoria leaf spot	stem rust		
spot blotch	stripe rust		
stem rust	tan spot		

Tilt (cont'd)

5. **When Used: Wheat, barley and oats.**
   Apply at a very early stage of disease development, any time from the beginning of stem elongation to before the head is half emerged. Best results have been achieved when Tilt is applied just as the flag leaf emerges. Conditions that favour a good crop are often the same conditions which favour leaf diseases.

   Canola: Apply Tilt during the rosette stage (between 2nd true leaf and bolting). Tilt will control blackleg and enhance yield potential during the early stages of canola growth.

   Note: Tilt should be applied as a preventative disease control measure. Established diseases are more difficult to control and may have already reduced crop vigour.

6. **How to Apply:**

   With: Aircraft or ground equipment.

   Rate: 200 mL/ac.

   Water volume: 80 L/ac (ground); 16 L/ac - 20 L/ac (air).

   Pressure: 275 kPa.

   Nozzles: Flat fan (ground); flat fan or hollow cone (air).

7. **Application Tips:** Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

8. **How it Works:** Partially systemic, Tilt is transported upwards in plants. Tilt has both preventative and curative activity. Length of control will vary from 3 - 4 weeks depending on disease, crop and environmental conditions. Strongly absorbed by most soils. Studies show that Tilt remains in the upper layers of the soil and very little to no leaching occurs.

   Effects of rainfall: If rainfall occurs within 1 hour of application, reapplication is necessary.

9. **Grazing and Harvest Restrictions:** Do not graze animals on treated green crops within 3 days of application. Last application must be made prior to 45 days before harvest in cereals and 60 days before harvest in canola. Straw from cereals can be fed to livestock provided no tank mix was used.

10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = technical (1,517), Tilt (2,105). Toxic to fish.

11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.**

    Symptoms of poisoning: Irritation of eyes or skin can result from overexposure. Prolonged or repeated inhalation may cause headache, dizziness or nausea.

    For physician: There is no specific antidote for this product.

12. **Storage:** Heated storage only.

Vitavax Dual Powder

(carbathiin + thiram + lindane)
Fungicide – Insecticide

Manufacturer **Gustafson**

DANGER POISON

1. **Formulation:** Dusts; Vitavax Dual Powder; 20.0% carbathiin + 28.9% thiram + 18.7% lindane; 1.5 kg tube.
2. **Registered Mixes:** None.
3. **Crops:** Barley, flax, oats, rye, wheat.
4. **Fungi Controlled:**
   Barley: false loose smut, true loose smut, covered smut.
   Flax: seed decay, damping-off.
   Oats: loose smut, covered smut.
   Rye: damping-off, seed decay, skin smut.
   Wheat: true loose smut, bunt or stinking smut.

   Insects controlled: Wireworms.
5. **When Used:** Pre-seeding or drill box treatment: treat seed before sowing. Do not store seed treated with powder.
6. **How to Apply:**

   With: Protective equipment, using standard dry seed treatment methodology described.

   Drill Box Treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix powder and seed thoroughly until seed is a uniform color. Do **not** mix with hands. Fill drill box to 1/2 capacity and sprinkle required amount of powder over seed. Mix with a paddle. Add seed to fill the box, cover with remaining powder and repeat. For large drill boxes, divide seed into several portions.

   Rate:

[illegible]	[illegible]	Insect	Dual Powder g/[illegible] kg seed
Barley	Smuts (covered, false loose, true loose)	Wireworms	70
Flax	Damping-off, seed decay seedling blight	Wireworms	70
Oats	Smuts (covered, loose)	Wireworms	95
Rye	Damping-off, seed decay, stem smut	Wireworms	60
Wheat	Bunt, smuts (stinking, true loose)	Wireworms	65

7. **Application Tips:** Under-treatment results in loss of efficacy and over-treatment may reduce germination.
8. **How it Works:** Lindane (an organochlorine insecticide) acts by ingestion, contact and, to a lesser extent, by fumigant action against many soil-dwelling and insect pests. Thiram, a fungicide, controls seed-borne diseases. Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for feed or food. Do not graze or feed livestock on treated areas for 4 weeks after planting.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = carbathiin (3,820), thiram (780 - 865) lindane (88 - 270).

Vitavax Dual Powder

(carbathiin + thiram + lindane)
Fungicide – Insecticide

Manufacturer: **Gustafson**

DANGER POISON

1. **Formulation:** Dusts; Vitavax Dual Powder; 20.0% carbathiin + 28.9% thiram + 18.7% lindane; 1.5 kg tube.
2. **Registered Mixes:** None.
3. **Crops:** Barley, flax, oats, rye, wheat.
4. **Fungi Controlled:**
   Barley: false loose smut, true loose smut, covered smut.
   Flax: seed decay, damping-off.
   Oats: loose smut, covered smut.
   Rye: damping-off, seed decay, skin smut.
   Wheat: true loose smut, bunt or stinking smut.

   Insects controlled: Wireworms.
5. **When Used:** Pre-seeding or drill box treatment: treat seed before sowing. Do not store seed treated with powder.
6. **How to Apply:**

   With: Protective equipment, using standard dry seed treatment methodology described.

   Drill Box Treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix powder and seed thoroughly until seed is a uniform color. Do **not** mix with hands. Fill drill box to 1/2 capacity and sprinkle required amount of powder over seed. Mix with a paddle. Add seed to fill the box, cover with remaining powder and repeat. For large drill boxes, divide seed into several portions.

   Rate:

Crop	Disease	Insect	Dual Powder g/25 kg seed
Barley	Smuts (covered, false loose, true loose)	Wireworms	70
Flax	Damping-off, seed decay seedling blight	Wireworms	70
Oats	Smuts (covered, loose)	Wireworms	95
Rye	Damping-off, seed decay, stem smut	Wireworms	60
Wheat	Bunt, smuts (stinking, true loose)	Wireworms	65

7. **Application Tips:** Under-treatment results in loss of efficacy and over-treatment may reduce germination.
8. **How it Works:** Lindane (an organochlorine insecticide) acts by ingestion, contact and, to a lesser extent, by fumigant action against many soil-dwelling and insect pests. Thiram, a fungicide, controls seed-borne diseases. Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for feed or food. Do not graze or feed livestock on treated areas for 4 weeks after planting.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = carbathiin (3,820), thiram (780 - 865) lindane (88 - 270).

Vitavax Dual Powder (cont'd)

11. **Precautions, First Aid:** Consumption of alcohol 24 hours before or after working with thiram may cause sweating, flushing, headache and nausea. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.** Intake may cause kidney and liver damage.

    Symptoms of poisoning: With lindane: nausea, vomiting, hyperirritability, convulsions, coma. Skin contact with fungicides may result in irritation and dermatitis.

12. **Storage:** Do not store in or around the home. Store in a dry area. Label stored, treated seed with: **Do not use for food or feed. This seed has been treated with carbathiin + thiram + lindane. Poisonous to man and animals. Keep out of reach of children.**

Vitavax Dual Solution

(carbathiin + lindane)
Fungicide – Insecticide

Manufacturer: **Gustafson**

WARNING POISON

1. **Formulation:** Solution; 180 g/L carbathiin + 165 g/L lindane; 10 L, 200 L containers.
2. **Registered Mixes:** None.
3. **Crops:** Barley, oats, wheat, rye.
4. **Fungi Controlled:**

    bunt (wheat)
    true loose smut (barley, oats, wheat)
    covered smut (barley, oats)
    stem smut (rye)
    false loose smut (barley

    Fungi suppressed: Common root rot (barley, oats, wheat, rye), leaf strip (barley), net blotch (barley).

    Insects controlled: Wireworms (barley, oats, wheat, rye).

5. **When Used:** Pre-seeding treatment: treat seed before sowing. Seed should be well cured, dry and cleaned before treatment. Seed may be planted immediately after treating.
6. **How to Apply:**

    With: On-farm treatment using an auger with a pump or dripolater device or custom application at seed cleaning plants.

    Water volume: Do **not** dilute with water.

Rate:

[illegible]	Disease	Insect	mL/25 kg seed
Barley	Smuts (covered, false loose, true loose), suppression of common root rot, * leaf stripe,* net blotch*	Wireworms	75 - 90**
Oats	Smuts (covered, loose), suppression of common root rot*	Wireworms	75
Wheat	Bunt, true loose smut, suppression of common root rot*	Wireworms	75 - 90**
Rye	Stem smut, suppression of common root rot*	Wireworms	75

Note:
* Seed treatment will not protect post-seedling plants from infection.
** For wheat and barley varieties highly susceptible to true loose smut and for high levels of smut or bunt on seed, the 90 mL rate will give increased disease control. Treated seed may give increased yields for crops growing under stress conditions such as disease, cool weather and drought.

7. **Application Tips:** Run auger at less than capacity to ensure adequate mixing. Uniform coverage at the correct rate is important for satisfactory results. Under-treatment will result in loss of efficacy and over-treatment may result in reduced germination. Calibrate seeding equipment using treated seed to ensure proper seeding rate.

8. **How it Works:** Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling. Lindane (an organochlorine) acts by ingestion, contact and, to a lesser extent, by fumigant action against many soil dwelling and phytophagous insects.

9. **Grazing and Harvest Restrictions:** Do not graze or feed livestock on treated areas for 4 weeks after planting. Do not use treated seed for feed, food or oil processing.

10. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = Vitavax Dual Solution (1740); carbathiin (3820), lindane (88 - 270). Lindane is toxic to fish, birds and other wildlife.

11. **Precautions, First Aid:** Do not reuse bags used for treated seed. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.** Take labelled container with you.

    Symptoms of poisoning: Apprehension, twitching, tremors and convulsions.

    For physician: There is no specific antidote. If swallowed, **intubate** the stomach. Treat as solid organochlorine pesticide poisoning. Diazepam is the anticonvulsant of choice.

12. **Storage:** Do not store below 0°C. Label stored treated seed **"Do not use for food, feed, or oil processing. This seed has been treated with carbathiin + lindane. Poisonous to man and animals." Keep out of reach of children.**

Rate:

Crop	Disease	Insect	mL/25 kg seed
Barley	Smuts (covered, false loose, true loose), suppression of common root rot, * leaf stripe,* net blotch*	Wireworms	75 - 90**
Oats	Smuts (covered, loose), suppression of common root rot*	Wireworms	75
Wheat	Bunt, true loose smut, suppression of common root rot*	Wireworms	75 - 90**
Rye	Stem smut, suppression of common root rot*	Wireworms	75

Note:
* Seed treatment will not protect post-seedling plants from infection.
** For wheat and barley varieties highly susceptible to true loose smut and for high levels of smut or bunt on seed, the 90 mL rate will give increased disease control. Treated seed may give increased yields for crops growing under stress conditions such as disease, cool weather and drought.

7. **Application Tips:** Run auger at less than capacity to ensure adequate mixing. Uniform coverage at the correct rate is important for satisfactory results. Under-treatment will result in loss of efficacy and over-treatment may result in reduced germination. Calibrate seeding equipment using treated seed to ensure proper seeding rate.

8. **How it Works:** Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling. Lindane (an organochlorine) acts by ingestion, contact and, to a lesser extent, by fumigant action against many soil dwelling and phytophagous insects.

9. **Grazing and Harvest Restrictions:** Do not graze or feed livestock on treated areas for 4 weeks after planting. Do not use treated seed for feed, food or oil processing.

10. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = Vitavax Dual Solution (1740); carbathiin (3820), lindane (88 - 270). Lindane is toxic to fish, birds and other wildlife.

11. **Precautions, First Aid:** Do not reuse bags used for treated seed. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.** Take labelled container with you.

    Symptoms of poisoning: Apprehension, twitching, tremors and convulsions.

    For physician: There is no specific antidote. If swallowed, **intubate** the stomach. Treat as solid organochlorine pesticide poisoning. Diazepam is the anticonvulsant of choice.

12. **Storage:** Do not store below 0°C. Label stored treated seed **"Do not use for food, feed, or oil processing. This seed has been treated with carbathiin + lindane. Poisonous to man and animals." Keep out of reach of children.**

Vitavax Powder/Vitaflo 280

(carbathiin + thiram)

Manufacturer: **Gustafson**

WARNING POISON

1. **Formulation:** Dust: 26.7% carbathiin + 38.8% thiram: 1.5 kg tube. Suspension: Vitaflo 280, 10 L, 200 L.
2. **Registered Mixes:** None.
3. **Crops:** Barley, flax, oats, rye, soybeans, wheat.
4. **Fungi Controlled:**

bunt (wheat)
covered smut (barley, oats)
head smut (meadow bromegrass)
damping-off (flax, rye, soybeans)
seed decay (flax, rye, soybeans)
stem smut (rye)
true loose smut (barley, oats, wheat)

5. **When Used:** Drill Box Treatment: treat seed before sowing. Seed should be well cured, dry and cleaned before treatment. Do not store treated seed.
6. **How to Apply:**

With: Protective equipment, using standard dry seed treatment methodology described.

Pre-seeding treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform color with a stick or paddle. Do **not** mix with hands. Fill the drill or planter box to 1/2 capacity and sprinkle 1/2 the required amount of powder over the seed and mix thoroughly. Seed should all be pink. Then add enough seed to fill the box, cover with the remaining powder and repeat mixing procedure. For large drill or planter boxes, it may be necessary to divide the seed into several portions. Clean planter plates periodically to prevent excessive build-up of treatment chemicals.

Rate:

Crop	Disease	Vitavax powder/ 25 kg seed	Vitaflo 280 mL/ per 100 kg seed
Barley	Smuts (covered, false loose, true loose)	50	230 - 330*
Flax	Damping-off, seed decay, seedling blight	60	525
Oats	Smuts (covered, loose)	70	330
Rye	Damping-off, seed decay, stem smut	45	230 - 330*
Soybeans	Damping-off, seed decay	65	260
Wheat	Smut (true loose)	55	—
Wheat	Bunt	40	230 - 330*
Meadow bromegrass	Head smut	115	—
Corn (field and sweet)	Seed decay, damping-off	—	280
Triticale	Seed decay, damping-off	—	200
Dry common beans	Seed decay, damping-off	—	260
Snap common beans	Seed decay, damping-off	—	260

* Use higher rates for true loose smut.

7. **Application Tips:** Vitavax Powder has no vapor action; therefore, thorough seed coverage is required. Seeding rate should be checked before planting and periodically during planting.
8. **How it Works:** Thiram is a fungicide that controls diseases carried on the seed. Carbathiin is a systemic fungicide that penetrates the seed coat to control diseases inside the seed and seedling.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for feed, food or oil processing. Do not graze or feed livestock on treated areas for 4 weeks after planting.

10. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = carbathiin: thiram (1,600).

11. **Precautions, First Aid:** Do not consume alcohol within 24 hours before or after working with thiram; may cause flushing, sweating, headache and nausea. **Keep out of reach of children. If in eyes,** flush immediately with running water. Get medical attention. **If on skin**, wash with warm water and pumice soap to remove dye. Intake may cause kidney, liver and nervous system damage. In severe cases, a coma may result. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If swallowed**, seek medical attention. Keep patient quiet. **Keep out of reach of children.**

    Symptoms of poisoning: Skin contact may result in irritation and dermatitis.

12. **Storage:** Do not store product in or around the home or near food or feed. Store powder in a dry area.

Vitavax rs Flowable/ Vitavax rs Dynaseal/Cloak

(carbathiin + thiram + lindane)

Fungicide – Insecticide

Manufacturer: Gustafson

DANGER POISON

1. **Formulation:** Vitavax rs Dynaseal: 49 g/L carbathiin + 80 g/L thiram + 600 g/L lindane; 100 L tube. Suspension: Vitavax rs Flowable: 45 g/L carbathiin + 90 g/L thiram + 680 g/L lindane; Cloak: 45 g/L carbathiin + 90 g/L thiram + 533 g/L lindane. 100 L, 1000 L containers.
2. **Registered Mixes:** None.
3. **Crops:** Canola, mustard, cole crops (cabbage, cauliflower, broccoli, rutabaga, brussel sprouts).
4. **Fungi Controlled:** Blackleg (seed borne), seed decay, seedling blight.

    Insects controlled: Flea beetles.

5. **When Used:** Seed should be well cured, dry and cleaned before treatment. Seed treated with flowable should be tested for germination before planting if stored for more than 9 months.
6. **How to Apply:**

    With: Protective equipment, using standard dry seed treatment methodology described. Seed-dressing equipment for liquid formulations. Clean planter plates periodically to prevent excessive chemical powder build-up.

    Pre-seeding treatment: Flowable or Cloak can be applied in a continuous treating operation with S-Series Treaters or OFT Treaters (Uniroyal Chemical), batch treaters, or cement mixers.

Crop	Disease	Insect	rs Dynaseal mL/25 kg seed	rs Flowable mL/25 kg seed	Cloak mL/25 kg seed
Canola, mustard	Blackleg, seed decay, seedling blight	Flea beetles	625	562	562
Cole crops	Blackleg, seed decay, seedling blight	Flea beetles		562	

Vitavax Powder/Vitaflo 280

(carbathiin + thiram)

Manufacturer Gustafson

WARNING POISON

1. **Formulation:** Dust; 26.7% carbathiin + 38.8% thiram; 1.5 kg tube. Suspension: Vitaflo 280, 10 L, 200 L.
2. **Registered Mixes:** None.
3. **Crops:** Barley, flax, oats, rye, soybeans, wheat.
4. **Fungi Controlled:**
   - bunt (wheat)
   - covered smut (barley, oats)
   - head smut (meadow bromegrass)
   - damping-off (flax, rye, soybeans)
   - seed decay (flax, rye, soybeans)
   - stem smut (rye)
   - true loose smut (barley, oats, wheat)
5. **When Used:** Drill Box Treatment: treat seed before sowing. Seed should be well cured, dry and cleaned before treatment. Do not store treated seed.
6. **How to Apply:**

   With: Protective equipment, using standard dry seed treatment methodology described.

   Pre-seeding treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform color with a stick or paddle. Do **not** mix with hands. Fill the drill or planter box to 1/2 capacity and sprinkle 1/2 the required amount of powder over the seed and mix thoroughly. Seed should all be pink. Then add enough seed to fill the box, cover with the remaining powder and repeat mixing procedure. For large drill or planter boxes, it may be necessary to divide the seed into several portions. Clean planter plates periodically to prevent excessive build-up of treatment chemicals.

   Rate:

[illegible]	[illegible]	[illegible]	[illegible]
Barley	Smuts (covered, false loose, true loose)	50	230 - 330*
Flax	Damping-off, seed decay, seedling blight	60	525
Oats	Smuts (covered, loose)	70	330
Rye	Damping-off, seed decay, stem smut	45	230 - 330*
Soybeans	Damping-off, seed decay	65	260
Wheat	Smut (true loose)	55	—
Wheat	Bunt	40	230 - 330*
Meadow bromegrass	Head smut	115	—
Corn (field and sweet)	Seed decay, damping-off	—	280
Triticale	Seed decay, damping-off	—	200
Dry common beans	Seed decay, damping-off	—	260
Snap common beans	Seed decay, damping-off	—	260

   * Use higher rates for true loose smut.

7. **Application Tips:** Vitavax Powder has no vapor action; therefore, thorough seed coverage is required. Seeding rate should be checked before planting and periodically during planting.
8. **How it Works:** Thiram is a fungicide that controls diseases carried on the seed. Carbathiin is a systemic fungicide that penetrates the seed coat to control diseases inside the seed and seedling.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for feed, food or oil processing. Do not graze or feed livestock on treated areas for 4 weeks after planting.

10. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = carbathiin: thiram (1,600).
11. **Precautions, First Aid:** Do not consume alcohol within 24 hours before or after working with thiram; may cause flushing, sweating, headache and nausea. **Keep out of reach of children. If in eyes,** flush immediately with running water. Get medical attention. **If on skin**, wash with warm water and pumice soap to remove dye. Intake may cause kidney, liver and nervous system damage. In severe cases, a coma may result. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If swallowed**, seek medical attention. Keep patient quiet. **Keep out of reach of children.**

    Symptoms of poisoning: Skin contact may result in irritation and dermatitis.
12. **Storage:** Do not store product in or around the home or near food or feed. Store powder in a dry area.

Vitavax rs Flowable/ Vitavax rs Dynaseal/Cloak

(carbathiin + thiram + lindane)

Fungicide – Insecticide

Manufacturer **Gustafson**

DANGER POISON

1. **Formulation:** Vitavax rs Dynaseal: 49 g/L carbathiin + 80 g/L thiram + +600 g/L lindane; 100 L tube. Suspension: Vitavax rs Flowable; 45 g/L carbathiin + 90 g/L thiram + 680 g/L lindane; Cloak; 45 g/L carbathiin + 90 g/L thiram + 533 g/L lindane, 100 L, 1000 L containers.
2. **Registered Mixes:** None.
3. **Crops:** Canola, mustard, cole crops (cabbage, cauliflower, broccoli, rutabaga, brussel sprouts).
4. **Fungi Controlled:** Blackleg (seed borne), seed decay, seedling blight.

    Insects controlled: Flea beetles.
5. **When Used:** Seed should be well cured, dry and cleaned before treatment. Seed treated with flowable should be tested for germination before planting if stored for more than 9 months.
6. **How to Apply:**

    With: Protective equipment, using standard dry seed treatment methodology described. Seed-dressing equipment for liquid formulations. Clean planter plates periodically to prevent excessive chemical powder build-up.

    Pre-seeding treatment: Flowable or Cloak can be applied in a continuous treating operation with S-Series Treaters or OFT Treaters (Uniroyal Chemical), batch treaters, or cement mixers.

Crop	Disease	Insect	rs Dynaseal mL/25 kg seed	rs Flowable mL/25 kg seed	Cloak mL/25 kg seed
Canola, mustard	Blackleg, seed decay, seedling blight	Flea beetles	625	562	562
Cole crops	Blackleg, seed decay, seedling blight	Flea beetles		562	

Vitavax rs Flowable/Vitavax rs Dynaseal/Cloak (cont'd)

7. **Application Tips:** Vitavax rs Flowable, Vitavax rs Dynaseal or Cloak: Important that seed and chemical are mixed quickly and uniformly. Prior to and during treatment, product should be kept at about 10°C for best results. Under-treatment results in loss of efficacy and over-treatment may reduce germination.
8. **How it Works:** Lindane (an organochlorine insecticide) acts by ingestion, contact and, to a lesser extent, by fumigant action against many soil-dwelling and insect pests. Thiram, a fungicide, controls seed-borne diseases. Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling. Controls the diseases listed. Protects against flea beetles for a few days after crop emergence.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for feed, food or oil processing. Do not leave treated seed exposed to birds or animals.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = Vitavax rs (302); carbathiin (3,820), thiram (780 - 865), lindane (88 - 270).
11. **Precautions, First Aid:** Consumption of alcohol 24 hours before or after working with thiram may cause sweating, flushing, headache and nausea. Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. Get medical attention immediately for eyes. **Keep out of reach of children. If in eyes**, flush immediately with running water. **If on skin**, wash with warm water and soap. **If swallowed**, seek medical attention immediately.

    Symptoms of poisoning: With lindane: nausea, vomiting, hyperirritability, convulsions, coma. Skin contact with fungicides may result in irritation and dermatitis.
12. **Storage:** Do not store in or around the home. Do not store Vitavax rs Flowable, Vitavax rs Dynaseal or Cloak at temperatures below 0°C or exceeding 25°C. Label stored, treated seed with: **Do not use for food, feed or oil-processing. This seed has been treated with carbathiin + thiram + lindane. Poisonous to man and animals. Keep out of reach of children.**

Vitavax Single Solution

(carbathiin)

Manufacturer: **Gustafson**

1. **Formulation:** Solution; 230 g/L; 10 L, 200 L containers.
2. **Registered Mixes:** None.
3. **Crops:** Barley, flax, oats, rye, wheat.
4. **Fungi Controlled:**

    bunt (wheat)
    covered smut (barley, oats)
    damping-off (flax)
    false loose smut (barley)
    seed decay (flax)
    loose smut (oats)
    stem smut (rye)
    true loose smut (barley, wheat)

    Fungi suppressed: Common root rot (barley, oats, rye, wheat), leaf stripe (barley), net blotch (barley).
5. **When Used:** A ready-to-apply formulation for commercial treaters and on-farm auger treating. Chemical is added directly to the seed as it enters the mixing chamber or auger. Seed may be planted immediately.
6. **How to Apply:**

    With: On-farm treatment: through the auger with special equipment or with an inexpensive pump or dripolator device; or treat at seed cleaning plant.

    Water volume: Do **not** dilute with water.

Rate:

[illegible]	[illegible]	[illegible]
Barley	Smuts (covered, false loose, true loose), suppression of common root rot,* leaf stripe,* net blotch*	60 - 75**
Flax	Damping-off, seed decay	100
Oats	Smuts (covered, loose), suppression of common root rot*	60
Rye	Stem smut, suppression of common root rot*	60
Wheat	Bunt, true loose smut, suppression of common root rot*	60 - 75**

* Seed treatment will not protect post-seedling plants from infection.

** For wheat and barley varieties highly susceptible to true loose smut and for high levels of smut or bunt on seed, the 75 mL rate will give increased disease control. Treated seed will give increased yields for crops growing under stress conditions such as disease, cool weather and drought.

7. **Application Tips:** Run auger at less than capacity to provide adequate mixing. Uniform coverage at the correct rate is important for satisfactory results. Under-treatment results in loss of efficacy and over-treatment may reduce germination. Calibrate seeding equipment using treated seed to ensure proper seeding rate.
8. **How it Works:** Carbathiin, a systemic fungicide, penetrates the seed coat to control disease.
9. **Grazing and Harvest Restrictions:** Treated seed not to be used for food, feed or oil processing. Do not graze feed livestock on treated areas for 4 weeks after planting.
10. **Toxicity:** Low mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = carbathiin (3,820).
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.** Do not reuse bags from treated seed or auger used for treated seed for other purposes.
12. **Storage:** Store above 0°C. Do not store in or around the home. Label stored treated seed **"Do not use for food, feed or oil processing. This seed has been treated with carbathiin." Keep out of reach of children.**

Rate:

Crop	Disease	mL/25 kg seed
Barley	Smuts (covered, false loose, true loose), suppression of common root rot,* leaf stripe,* net blotch*	60 - 75**
Flax	Damping-off, seed decay	100
Oats	Smuts (covered, loose), suppression of common root rot*	60
Rye	Stem smut, suppression of common root rot*	60
Wheat	Bunt, true loose smut, suppression of common root rot*	60 - 75**

* Seed treatment will not protect post-seedling plants from infection.

** For wheat and barley varieties highly susceptible to true loose smut and for high levels of smut or bunt on seed, the 75 mL rate will give increased disease control. Treated seed will give increased yields for crops growing under stress conditions such as disease, cool weather and drought.

7. **Application Tips:** Run auger at less than capacity to provide adequate mixing. Uniform coverage at the correct rate is important for satisfactory results. Under-treatment results in loss of efficacy and over-treatment may reduce germination. Calibrate seeding equipment using treated seed to ensure proper seeding rate.
8. **How it Works:** Carbathiin, a systemic fungicide, penetrates the seed coat to control disease.
9. **Grazing and Harvest Restrictions:** Treated seed not to be used for food, feed or oil processing. Do not graze feed livestock on treated areas for 4 weeks after planting.
10. **Toxicity:** Low mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = carbathiin (3,820).
11. **Precautions, First Aid:** Protect yourself by reducing skin and eye exposure. Wear coveralls, brimmed hard hat, goggles, respirator, unlined nitrile or neoprene gloves and neoprene overboots or rubber boots. In addition, wear a waterproof apron when handling the pesticide concentrate (see page 29 for further information). Follow directions for *Cleaning of Clothes and Equipment* (see page 32) before reuse. **If in eyes or on skin**, use standard first aid measures. Get medical attention immediately for eyes. **If swallowed**, seek medical attention. **Keep out of reach of children.** Do not reuse bags from treated seed or auger used for treated seed for other purposes.
12. **Storage:** Store above 0°C. Do not store in or around the home. Label stored treated seed **"Do not use for food, feed or oil processing. This seed has been treated with carbathiin." Keep out of reach of children.**

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Chemical Control of Rodents

Introduction

Rodent problems are usually related to or are a product of human cultural practices. Understanding how to modify certain activities and situations will help prevent or reduce problems with rodents. For example, pastures should not be overgrazed as this encourages the proliferation of ground squirrels. Mouse problems can be prevented or drastically reduced, especially in buildings, by eliminating their food source and areas of shelter. Rotational cropping with weed control will prevent the establishment of significant gopher populations. However, not all rodent problems can be corrected by management or cultural changes.

Secondary poisoning describes poisoning that results when one animal consumes another that has been poisoned with a toxicant, and it, in turn, is killed. When using baits, farmers must check their success on a regular basis (every day is advisable). Dead rodents above ground should be picked up and removed to prevent the possibility of secondary poisoning of wildlife and dogs. Where there is evidence of secondary poisoning, the poisoning program should be stopped immediately and re-evaluated. Dead rodents should be buried deep enough so that scavenging animals can't dig them up.

Chemical control, combined with management and cultural modifications, is often required to eliminate established rodent populations and to prevent their recurrence.

This section contains information on chemicals used to control or repel woodchucks, ground squirrels, mice, pocket gophers, hares and rabbits.

Marketing Classification

Each rodenticide or rodent repellent is classified according to the use for which it is intended.

The categories are **Domestic, Commercial** or **Restricted.**

A product classified as **Domestic** allows consumers to use it in and around their homes.

A **Commercial** product can be used by persons engaged in a commercial activity, such as a farmer, on land they own or control. Commercial pest control personnel may use this category product within commercial establishments (i.e., restaurants, hotels and food stores).

Restricted products are extremely hazardous. Therefore, their use is more limited and controlled. These products may be hazardous because of their inherent toxicity or intended use in environmentally sensitive areas. For example, Strychnine requires the distributor to record the users' name, address, land location, intended use and signature at the time of sale.

Anticoagulants *[bromodialone, chlorophacinone, diphacinone, warfarin, warfarin + ergocalciferol, warfarin + sulfaquinoxaline (Numerous Manufacturers)]*

Manufacturer [brodifacoum (Zeneca Agro)], [warfarin + ergocalciferol (Novartis Crop Protection)]

DANGER POISON

1. **Formulations:**

[illegible]	[illegible]	[illegible]	[illegible]
Bait block	Brodifacoum, bromodialone, chlorophacinone, diphacinone, pindone	0.025%, 0.005%	50 g - 15 kg
Dust or powder	Warfarin	0.5%	100 g
Extruded pellets	Brodifacoum, bromodialone, chlorophacinone, diphacinone	0.005%	50 g - 20 kg
"	Pindone, warfarin	0.025%	50 g - 9 kg
"	Warfarin + sulfaquinoxaline	0.025% + 0.025%	500 g - 1 kg
Particulate	Bromodialone, chlorophacinone	0.005%	20 g - 20 kg
"	Warfarin, pindone	0.025%	454 g - 20 kg
"	Warfarin + ergocalciferol	0.025% + 0.1%	500 g, 10 kg
"	Warfarin + sulfaquinoxaline	0.025% + 0.025%	500 g - 10 kg
Sodium salt of Diphacinone	Diphacinone	0.106%	50 mL
Soluble granules	Warfarin, pindone	0.5%, 1.5%	11.3 g
Solution	Chlorophacinone	0.28%, 0.07%	250 mL, 1 L
Wholegrain	Warfarin	0.025%	340 - 450 gm
	Diphacinone	0.005%	250 gm

Note: Brodifacoum and bromodialone are single-feeding anticoagulants; all others are multiple-feeding anticoagulants.

2. **Marketing Category:** Domestic, commercial.

Anticoagulants *[bromodialone, chlorophacinone, diphacinone, warfarin, warfarin + ergocalciferol, warfarin + sulfaquinoxaline (Numerous Manufacturers)]*

Manufacturer: **[brodifacoum (Zeneca Agro)], [warfarin + ergocalciferol (Novartis Crop Protection)]**

DANGER POISON

1. Formulations:

Formulation	Active Ingredient (AI)	Concentration (AI)	Container Sizes
Bait block	Brodifacoum, bromodialone, chlorophacinone, diphacinone, pindone	0.025%, 0.005%	50 g - 15 kg
Dust or powder	Warfarin	0.5%	100 g
Extruded pellets	Brodifacoum, bromodialone, chlorophacinone, diphacinone	0.005%	50 g - 20 kg
"	Pindone, warfarin	0.025%	50 g - 9 kg
"	Warfarin + sulfaquinoxaline	0.025% + 0.025%	500 g - 1 kg
Particulate	Bromodialone, chlorophacinone	0.005%	20 g - 20 kg
"	Warfarin, pindone	0.025%	454 g - 20 kg
"	Warfarin + ergocalciferol	0.025% + 0.1%	500 g, 10 kg
"	Warfarin + sulfaquinoxaline	0.025% + 0.025%	500 g - 10 kg
Sodium salt of Diphacinone	Diphacinone	0.106%	50 mL
Soluble granules	Warfarin, pindone	0.5%, 1.5%	11.3 g
Solution	Chlorophacinone	0.28%, 0.07%	250 mL, 1 L
Wholegrain	Warfarin	0.025%	340 - 450 gm
	Diphacinone	0.005%	250 gm

Note: Brodifacoum and bromodialone are single-feeding anticoagulants; all others are multiple-feeding anticoagulants.

2. Marketing Category: Domestic, commercial.

Anticoagulants (cont'd)

3. Registered Uses:

	Products							
	Chlorophacinone	Diphacinone	Warfarin (W)	W+Calciferol	W+Sulfaquinoxaline	Brodifacoum	Bromodialone	Pindone
Mice and Voles								
Farm buildings	X	X	X	X	X	X	X	X
Food service areas	X	X	X	X	X		X	
Fruit trees, ornamentals, vines	X	X	X		X			
Garbage dumps	X	X	X		X	X	X	
Grainaries (empty)	X	X	X	X	X	X		X
Human dwellings	X	X	X	X	X	X	X	X
Nurseries	X	X			X			
Orchards	X	X			X			
Storage buildings	X	X	X	X	X	X	X	X
Outdoor living areas (parks, playgrounds)	X				X			
Sewers		X	X				X	
Woodlands	X	X						

Ground squirrels and pocket gophers: Chlorophacinone and dipachinone in farmyards, pasture/rangeland, forage/field crops, gardens, nurseries, turf, residential areas.

4. Animals Controlled: Ground squirrels, pocket gophers, mice, voles (field mice).

5. When Used:

Ground squirrels: Springtime, prior to vegetation regrowth, may provide better results; late summer and post-harvest for best control.

Pocket gophers: Use in early spring before "green-up" or late fall for best results.

Mice, voles: Best results when used after removal of other food sources.

6. How to Apply:

With: For ground squirrels, baits can be placed in a bait station or into burrows and covered. For pocket gophers, apply bait into burrow by hand probe or with use of tractor-drawn applicator. Apply for mice and voles within a bait station. Weatherproof baits may be broadcast outside but must be under cover (i.e., grainbin, balestack, etc.) in late fall to control mouse and vole damage to nursery stock, ornamentals and shelterbelts.

Rate:

Bait Station	Animal	Formulation
500 g/station every 30 - 60 m of infested area depending on animal density	Ground squirrel	Pellets, liquid concentrate on grain, grain bait
15 - 50 g/protected station at intervals of 2 - 3 m	Mice, voles	Meal, pellets, dust/powder, liquid concentrate
1 or 2 blocks/station at intervals of 2 - 3 m	Mice, voles	Bait blocks
One 11.3 g packet/L of water in chick fountain or shallow dish near feeding sites	Mice	Soluble granules
Pour 100 mL of solution into shallow dish near feeding sites	Mice	Solution

Note: Bait station should be designed to keep bait dry, contained from windblow or animal scattering as well as safe from livestock, birds and other non-targets.

Burrows		
15 - 20 g/burrow entrance	Ground squirrel	Pellets, liquid concentrate on grain, grain bait
15 - 20 g/burrow or 120 - 240 g/ac with tractor-drawn applicator	Pocket gopher	Pellets, grain bait

Number of applications:

Mice and voles: Brodifacoum and bromodialone: 1 usually effective. Can be re-applied after 1 week if rodents still present. All other anticoagulants: maintain uninterrupted supply of bait until feeding and rodent activity ceases.

7. **Application Tips:**

   Bait Station: Only place bait in areas accessible to target animals in secure bait stations that cannot be overturned or broken into by children, pets, or wild or domestic animals.

   Burrows: Place ground squirrel bait far into each burrow opening with long spoon. This placement makes the bait inaccessible to non-target animals. Ensure equipment used to apply pocket gopher bait is in good repair and adjusted or calibrated properly before use. Monitor use closely.

8. **How They Work:**

   Anticoagulant poisons: interfere with clotting of blood and cause damage to tiny blood vessels. They prevent formation of prothrombin by competition with vitamin K. Rate of blood clotting is gradually reduced and the animal bleeds to death.

   Calciferol: mobilizes calcium and causes death from organ calcification and heart attack.

   Sulfaquinoxaline: is an antibacterial agent that increases the effectiveness of warfarin by inhibiting intestinal bacteria that produce vitamin K.

9. **Expected Results:** Rodents usually begin to die 3 - 4 days after they ingest anticoagulants.

10. **Effects of Rainfall:** Can result in deterioration and molding of exposed bait. Extended rainfall will also effect field rodent activities, reducing bait uptake.

11. **Movement in Soil:** None.

12. **Grazing and Cropping Restrictions:** Do not use ground squirrel bait stations in areas accessible to livestock or pets.

13. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = brodifacoum (0.27), bromodialone (1.12), chlorophacinone (5.0), diphacinone (2 - 3), warfarin (50 - 100). Potentially toxic to birds and other animals.

14. **Precautions, First Aid:** Wear gloves. Wash hands after use. Label bait stations **"Poison." Keep out of reach of children.** Pick up and dispose of dead rodents to prevent secondary poisoning of scavengers.

Anticoagulants (cont'd)

3. Registered Uses:

	Chlorophacinone	Diphacinone	Warfarin (W)	W+Calciferol	W+Sulfaquinoxaline	Brodifacoum	Bromodialone	Pindone
Farm buildings	X	X	X	X	X	X	X	X
Food service areas	X	X	X	X	X		X	
Fruit trees, ornamentals, vines	X	X	X		X			
Garbage dumps	X	X	X		X	X	X	
Grainaries (empty)	X	X	X	X	X	X		X
Human dwellings	X	X	X	X	X	X	X	X
Nurseries	X	X			X			
Orchards	X	X			X			
Storage buildings	X	X	X	X	X	X	X	X
Outdoor living areas (parks, playgrounds)	X				X			
Sewers		X	X				X	
Woodlands	X	X						

Ground squirrels and pocket gophers: Chlorophacinone and dipachinone in farmyards, pasture/rangeland, forage/field crops, gardens, nurseries, turf, residential areas.

4. Animals Controlled: Ground squirrels, pocket gophers, mice, voles (field mice).

5. When Used:

Ground squirrels: Springtime, prior to vegetation regrowth, may provide better results; late summer and post-harvest for best control.

Pocket gophers: Use in early spring before "green-up" or late fall for best results.

Mice, voles: Best results when used after removal of other food sources.

6. How to Apply:

With: For ground squirrels, baits can be placed in a bait station or into burrows and covered. For pocket gophers, apply bait into burrow by hand probe or with use of tractor-drawn applicator. Apply for mice and voles within a bait station. Weatherproof baits may be broadcast outside but must be under cover (i.e., grainbin, balestack, etc.) in late fall to control mouse and vole damage to nursery stock, ornamentals and shelterbelts.

Rate:

[illegible]	[illegible]	[illegible]
500 g/station every 30 - 60 m of infested area depending on animal density	Ground squirrel	Pellets, liquid concentrate on grain, grain bait
15 - 50 g/protected station at intervals of 2 - 3 m	Mice, voles	Meal, pellets, dust/powder, liquid concentrate
1 or 2 blocks/station at intervals of 2 - 3 m	Mice, voles	Bait blocks
One 11.3 g packet/L of water in chick fountain or shallow dish near feeding sites	Mice	Soluble granules
Pour 100 mL of solution into shallow dish near feeding sites	Mice	Solution

Note: Bait station should be designed to keep bait dry, contained from windblow or animal scattering as well as safe from livestock, birds and other non-targets.

[illegible]		
15 - 20 g/burrow entrance	Ground squirrel	Pellets, liquid concentrate on grain, grain bait
15 - 20 g/burrow or 120 - 240 g/ac with tractor-drawn applicator	Pocket gopher	Pellets, grain bait

Number of applications:

Mice and voles: Brodifacoum and bromodialone: 1 usually effective. Can be re-applied after 1 week if rodents still present. All other anticoagulants: maintain uninterrupted supply of bait until feeding and rodent activity ceases.

7. **Application Tips:**

   Bait Station: Only place bait in areas accessible to target animals in secure bait stations that cannot be overturned or broken into by children, pets, or wild or domestic animals.

   Burrows: Place ground squirrel bait far into each burrow opening with long spoon. This placement makes the bait inaccessible to non-target animals. Ensure equipment used to apply pocket gopher bait is in good repair and adjusted or calibrated properly before use. Monitor use closely.

8. **How They Work:**

   Anticoagulant poisons: interfere with clotting of blood and cause damage to tiny blood vessels. They prevent formation of prothrombin by competition with vitamin K. Rate of blood clotting is gradually reduced and the animal bleeds to death.

   Calciferol: mobilizes calcium and causes death from organ calcification and heart attack.

   Sulfaquinoxaline: is an antibacterial agent that increases the effectiveness of warfarin by inhibiting intestinal bacteria that produce vitamin K.

9. **Expected Results:** Rodents usually begin to die 3 - 4 days after they ingest anticoagulants.

10. **Effects of Rainfall:** Can result in deterioration and molding of exposed bait. Extended rainfall will also effect field rodent activities, reducing bait uptake.

11. **Movement in Soil:** None.

12. **Grazing and Cropping Restrictions:** Do not use ground squirrel bait stations in areas accessible to livestock or pets.

13. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = brodifacoum (0.27), bromodialone (1.12), chlorophacinone (5.0), diphacinone (2 - 3), warfarin (50 - 100). Potentially toxic to birds and other animals.

14. **Precautions, First Aid:** Wear gloves. Wash hands after use. Label bait stations **"Poison." Keep out of reach of children.** Pick up and dispose of dead rodents to prevent secondary poisoning of scavengers.

Symptoms of poisoning: Pallor and weakness from blood loss, bloody nose and feces, internal bleeding, swelling and discoloration from blood in tissue. **If in eyes or on skin**, use standard first aid measures (see page 31). **If swallowed**, seek medical attention.

15. **Storage:** Store in locked room or container. Do not store with other pesticides or chemicals; rodents are very taste and odor sensitive and will be repelled by contaminated bait. Keep bait in original container.

Acute Poisons

Quintox, Rampage

[cholecalciferol (Vitamin D3)]

Manufacturer: **Kem San/A.P.A.**

DANGER POISON

1. **Formulations:** Extruded Pellets; 0.075%; 50 x 30 g place pack, 8 x 30 g boxes, 5.5 lb pail. Treated Seed; 0.075%; 10 g place packs, 5 lb pail.
2. **Marketing Category:** Domestic.
3. **Registered Uses:** Dwellings, farm buildings, grainary bins (empty), processing plants (non-food), storage areas (non-food), service establishments (non-food).
4. **Animals Controlled:** Mice, voles (meadow mice).
5. **When Used:** Any time of year.

   Number of applications: Maintain uninterrupted supply of bait until feeding ceases. If reinfestation occurs, repeat treatment. If a continuous problem exists, establish permanent bait stations and replenish bait as required.
6. **How to Apply:** Place 1 bait pack at 2 - 3 m intervals in infested area or place up to 20 g in covered bait stations at 2 - 3 m intervals in the problem area.
7. **Application Tips:** Remove alternative food sources and reduce mouse shelter as much as possible prior to bait use. Place bait where mice will find it such as along walls, near gnawed openings or beside burrows, or generally where mice or their signs (i.e., droppings, tracks) are noticed. Protect bait from rain, snow or other moisture. Replace old, stale bait. Keep fresh bait out until feeding ceases.
8. **How it Works:** Cholecalciferol mobilizes calcium from the bones of affected rodents into the bloodstream. This action causes hypercalcemia and death from heart failure. Feeding stops once a lethal dose is consumed. Less than 3 g of consumed bait is sufficient to kill a mouse.
9. **Expected Results:** A lethal dose can be consumed by a mouse in one feeding, but usually this dosage level occurs after several smaller feedings over several days. Death results 2 - 4 days after a lethal dose is consumed.
10. **Effects of Rainfall:** Rain, snow or other moisture will cause deterioration and molding of bait and will result in poor bait acceptance by mice.
11. **Movement in Soil:** None.
12. **Grazing and Cropping Restrictions:** None. Not for outside use. Do not allow pet access to bait.
13. **Toxicity:** High mammalian toxicity. Acute oral LD$_{50}$ (rats) (mg/kg) = 100% concentration (43.6 mg/kg). Low dermal and oral toxicity for birds. No secondary hazards exist.
14. **Precautions, First Aid:** Wear gloves. Wash hands after use. Label bait stations **"Poison." Keep out of reach of children, domestic animals and pets.**

Symptoms of poisoning: Hypercalcemia. **If in eyes or on skin**, use standard first aid measures (see page 31). **If swallowed**, seek medical attention.

15. **Storage:** Store under lock and key, in original containers. Do not store with other pesticides or chemicals; rodents are very odor and taste sensitive and will be repelled by contaminated bait.

Strychnine

Manufacturer: **Elston/K-9/Saskem/NuGro/Maxim/Wilco**

DANGER POISON

1. **Formulations:** Pellet; 0.35%; 454 g jar, 2.27 kg bag, 18.2 kg bag. Grain; 0.40%; 4.5 kg bag, 25 kg bag. Granular; 0.40%.
2. **Marketing Category:** Restricted. A record of the user's name, address, land location and signature must be kept by distributors.
3. **Registered Uses:** Forage/field crops, pasture/rangeland.
4. **Animals Controlled:** Northern pocket gopher and ground squirrels.
5. **When Used:** Springtime, prior to vegetation regrowth, may provide better results; late summer or early fall for best results following harvest or heavy frost damage to vegetation.

   Number of applications:

   Ground squirrel: One application usually effective. Rebait active burrows a second time. Use traps or pyrotechnics if second application fails, specially in small areas (i.e., < 2 acres).

   Pocket gopher: Hand treatment: One application often effective. Rebait active burrows up to 14 days following initial treatment. If burrow builder is used, rebait active burrows by hand treatment at each active burrow. Use pocket gopher traps where poison has not removed gophers.

   Rate: Follow directions on label. For ground squirrel, place 5 mL of bait into each burrow entrance. For pocket gopher, place 5 mL into tunnel near fresh dirt mounds or apply 0.12 - 0.24 kg/ac of bait with tractor-drawn applicator.
6. **Application Tips:**

   Ground squirrel: Place bait far into most active tunnel with long-handled spoon and cover burrow entrance so as not to cover bait. Remove dead rodents to prevent poisoning of scavenging animals.

   Pocket gopher: Use commercial hand probe or metal rod to locate tunnel. Begin probing in-line between two fresh dirt mounds. Carefully seal entry point with dirt after bait is placed.
7. **How it Works:** Enters bloodstream and interferes with the central nervous system. Symptoms appear within 5 - 30 minutes after ingestion. Convulsions lead to death from respiratory failure.
8. **Expected Results:** Reduction in rodent numbers in control area. **Poor results may occur if** directions for use are not carefully followed or if poor quality, stale or contaminated bait is used. Store rodent baits away from chemicals or other strong odours.
9. **Effects of Rainfall:** None if bait applied according to label instructions and bait placed well into the burrow.
10. **Movement in Soil:** None.
11. **Grazing and Cropping Restrictions:** None if used according to label instructions and bait is not spilled above ground. Precautionary measures should be taken to prevent non-target poisoning.
12. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (12 mg/kg). Lethal dose to man 30 - 60 mg/kg. Toxic to birds, cattle and other animals.

Strychnine (cont'd)

13. **Precautions, First Aid:** Wear gloves. Wash hands after use. **Keep out of reach of children.**

    Symptoms of poisoning: Frequent convulsions with intervals of quiescent periods. Body stiffens and arches, breathing stops. **If in eyes or on skin**, use standard first aid measures (see page 31). **If swallowed**, seek medical attention immediately.

14. **Storage:** Keep bait sealed in containers in which they were purchased. Do not re-package or distribute to other containers. Keep under lock and key and in a warm, dry place. Do not freeze.

Zinc Phosphide

Manufacturer: **Sanex/A.P.A./United Agri Products**

DANGER POISON

1. **Formulations:** Extruded Pellet, cracked bait; 2.0%; 1.36 kg bottle, 6 x 454 g pack, 20 kg bag, 22.7 kg bag.
2. **Marketing Category:** Commercial.
3. **Registered Uses:**

    Ground squirrels, pocket gophers: Outside use only around farm buildings (ground squirrel only), farmyards, forage/field crops, gardens, nurseries, pasture/rangeland, residential areas, turf.

    Mice, voles: Outside use only around dwellings, farm buildings, farmyards, orchards, storage areas.

4. **Animals Controlled:** Ground squirrels, mice and voles, pocket gophers.
5. **When Used:**

    Mice, voles: Apply in orchards prior to snowfall and before leaf fall and lodging of grass. Use outdoors within bait stations according to label and as necessary.

    Ground squirrels, pocket gophers: Springtime, prior to vegetation regrowth, may provide better results; late summer to post-harvest for best control.

    Number of applications:

    Ground squirrels: One usually. Plug all burrows after treatment, rebait opened burrows next day.

    Mice, voles: Outside, maintain uninterrupted supply until feeding ceases. Outside, re-apply after 2 weeks if mice still present (i.e., droppings, chewing, etc.).

    Pocket gophers: Re-apply after 10 days where rodents still active.

6. **How to Apply:**

    With: Bait stations, burrow builder, cyclone seeder, hand baiting, tractor-drawn burrow applicator for pocket gophers.

    Rate:

    Ground squirrels: Place 5 g far into each burrow with a spoon, or place continual supply in protected bait station until rodents are controlled.

    Mice, voles: Outside areas, place 5 g in protected bait stations every 2 - 4 m. Outdoor areas, apply with cyclone spreader at 405 g - 1.6 kg/ac. Apply 15 g around trees. If hazard to other animals exists, place 15 g of bait in protected bait stations every 2 - 4 m.

    Pocket gophers: 5 g of bait into burrow using commercial or home-made probe. Apply with burrow builder at .3 - .6 kg of bait/hectare.

7. **Application Tips:**

    Ground squirrel: Do not apply on bare ground. Never place bait in unprotected heaps or piles.

    Pocket gopher: For hand baiting, treat near fresh soil mounds. Plug probe hole after applying bait.

8. **How it Works:** On contact with dilute acids of the stomach, phosphine is released. Death results from asphyxia.

9. **Expected Results:** Reduction or elimination of rodent population.
10. **Effects of Rainfall:** Exposed bait can become neutralized and ineffective within several days. Pellets should be used to prevent rapid breakdown of toxicity.
11. **Movement in Soil:** None, breaks down rapidly to phosphine.
12. **Grazing and Cropping Restrictions:** Use in a manner to prevent access to livestock, pets and non-target wildlife. Only use outside of buildings.
13. **Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (27). Toxic to all birds and other animals.
14. **Precautions, First Aid:** Wear gloves. Wash hands after use. Keep unused bait in original container. **Keep out of reach of children.**

    Symptoms of poisoning: Nausea, vomiting (black vomitus with smell of phosphine), abdominal pain, chest tightness, excitement and cold sensations. **If in eyes or on skin**, use standard first aid measures (see page 31). **If swallowed**, seek medical attention.
15. **Storage:** Do not store with other chemicals or pesticides, as the bait will become contaminated. Store under lock and key. Store bait in original container. Keep away from moisture.

Fumigants

Gaseous Oxides of Sulphur

(gas cartridges)

Manufacturer: **Apache/Sanex**

DANGER POISON

1. **Formulations:** Granular solid within cardboard cylinder; major ingredients – sodium nitrate, charcoal, sulphur (contains various components depending on manufacturer); 75 - 85 g/cylinder, 3 cylinder package.
2. **Marketing Category:** Domestic.
3. **Registered Uses:** Farmyards, forage/field crops, gardens, nurseries, orchards, outdoor living areas, pasture/rangeland, turf.
4. **Animals Controlled:** Woodchucks, ground squirrels, pocket gophers.
5. **When Used:** Spring through fall when rodents are active and causing damage.
6. **How to Apply:** Place fuse in a sulphur oxide cartridge, light fuse and insert cartridge as far as possible into rodent burrow. When cartridge begins to burn, plug burrow with soil to prevent smoke from escaping.

    Rate: One cartridge/rodent burrow is usually sufficient.
7. **Application Tips:** During gasing operation, watch for smoke exiting nearby burrows and plug these also.
8. **How it Works:** As a cartridge ignites, smoke and toxic gases are produced and fill the rodents' burrow. Rodents breathe toxic fumes and are asphyxiated.
9. **Expected Results:** Asphixiation of rodents in treated burrows. **Poor results may be expected if** cartridges are used to control pocket gophers and ground squirrels that have extensive burrow systems. All areas of an extensive burrow system will not be penetrated by toxic gases from a cartridge. These areas provide a retreat for inhabiting rodents. Rodents may also plug burrow runways to block off toxic fumes.
10. **Effects of Rainfall:** None.
11. **Movement in Soil:** None.

Gaseous Oxides of Sulphur (cont'd)

12. **Grazing and Cropping Restrictions:** None.
13. **Toxicity:** High acute mammalian toxicity in enclosed area. 1,000 mg/kg of carbon monoxide, a major product of combustion, causes death.
14. **Precautions, First Aid:** Wear gloves. Avoid prolonged breathing of fumes. Do not use under wooden buildings or flammable material. **Keep out of reach of children.**

    Symptoms of poisoning: Same as carbon monoxide. Tightness across forehead, headache, throbbing at the temples, dizziness, weariness, nausea, vomiting, collapse and unconsiousness. **If inhaled**, remove victim to fresh air and keep him lying down. If breathing has stopped, apply artificial respiration. Get medical attention promptly.
15. **Storage:** Store in cool, dry place as cartridges will absorb water. Keep under lock and key away from combustion source.

Repellents

Ro-pel *[denatonium benzoate]*

Manufacturer **Sharp**

1. **Formulations:** Liquid; 0.065%; 946 mL spray bottle, 3.78 L bottles, 18.9 L, 207.8 L drums.
2. **Marketing Category:** Domestic, commercial.
3. **Registered Uses:** Nursery stock, ornamentals.

    Note: Never mix with other chemicals. Use full strength.
4. **Animals Controlled:** Mice and voles, porcupines, rabbits and hares, beavers, ground squirrels, woodchucks.
5. **When Used:** Spring to fall. Before damage is caused or to prevent further damage. A second application may be necessary on new vegetation growth.
6. **How to Apply:** Apply to areas of damage or on areas normally damaged by rodents. **Do not apply to edible parts of trees or plants.**

    With: Brush or sprayer.

    Rate: Generously apply to all surfaces to be protected until completely wet. Apply second coat for extra protection.
7. **Application Tips:** Allow first treatment to dry before reapplying. Do not apply on windy or rainy days. Application on dry surfaces is preferable. Although this product is not toxic to plants or trees, do not use on diseased specimens.
8. **How it Works:** A taste repellant. Attempts by rodents to eat or chew on treated areas results in a bitter taste.
9. **Expected Results:** Prevention of rodent damage to treated areas of plants. **Poor results may be expected if** plants improperly treated or improper amount applied.
10. **Effects of Rainfall:** Do not apply when raining or if rain is forecast. Rain will wash product from treated areas.
11. **Movement in Soil:** None.
12. **Grazing and Cropping Restrictions:** Do not apply to edible parts of crops or plants, fruit or nuts.

13. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (greater than 1,500). Non-toxic to plant and animal life.
14. **Precautions, First Aid:** Avoid contact with eyes, skin, food and clothing. Wear impervious rubber gloves. Wash hands after use. Do not smoke or eat while applying. **Keep out of reach of children. If in eyes**, flush with plenty of water for at least 15 minutes and get medical attention. **If on skin**, wash first with isoropyl or ethyl alcohol, then soap and water. If an irritation develops and persists, get medical attention.

    Symptoms of poisoning: Unknown. **If swallowed**, seek medical attention.
15. **Storage:** Store in cool, dry area under lock and key. Do not store near food, feed or fertilizers. Keep product in original container.

Thiram

Manufacturer: **Wilson**

WARNING POISON

1. **Formulations:** 120 g/L suspension; 12 x 500 mL bottle, 4 x 4 L case, 4 L container.
2. **Marketing Category:** Domestic, Commercial.
3. **Registered Uses:** Fruit trees, nursery stock, orchards, woody ornamentals.

    Note: Do not mix with other pesticides.
4. **Animals Controlled:** Mice and voles, rabbits and hares.
5. **When Used:**

    Mice and voles: Coat the base of trees or shrubs thoroughly any time during the late fall.

    Rabbits and hares: Before snowfall, treat areas of trees or shrubs accessible to rabbits or hares, even after heavy snow accumulation. **Apply at temperatures above 4°C.**
6. **How to Apply:** Product can be sprayed or brushed on. In the case of planting stock, plants can be dipped.

    With: Paint brush, sprayer.

    Rate:

    Brushing: Thoroughly apply undiluted product with paint brush on areas of potential or occuring damage.

    Dipping: When planting, dip the tops of young trees or plants into undiluted product.

    Spraying: Mix product with equal volume of water. Apply to point of runoff.
7. **Application Tips:** Use immediately after being mixed with water. Keep container tightly closed to prevent evaporation.
8. **How it Works:** A taste repellant. Rodents are discouraged from feeding on vegetation treated with this product.
9. **Expected Results:** Prevention of rodent damage to areas treated.
10. **Effects of Rainfall:** Heavy rains can wash part of the product off the treatment site. Do not apply if raining or if threat of rain exists.
11. **Movement in Soil:** None.
12. **Grazing and Cropping Restrictions:** Do not apply to plant parts used for food or feed.
13. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) (mg/kg) = (780 - 865). Skin contact or inhalation may cause irritation of the nose, throat or skin and may induce an allergic reaction.

14. **Precautions, First Aid:** Wash thoroughly after handling. Wash contaminated clothes with soap and water before reuse. Do not consume alcohol immediately before or within 24 hours after use of Thiram. Avoid breathing spray mist. Wash contaminated clothing with soap and water before wearing. **Keep out of reach of children.**

    Symptoms of poisoning: Nausea, vomiting, diarrhea, anorexia, hyperactivity and hypothermia.

    First aid: If in eyes or on skin, use standard first aid measures (see page 31). **If swallowed**, seek medical attention.

15. **Storage:** Store in a cool, dry, ventilated place away from feeds and food. Store above 0°C.

HERBICIDE SELECTOR CHART – CEREALS

Crop	Bindweeds	Bluebur	Buckwheat (Tartary)		Buckwheat (Wild)		Buttercup (Creeping, Tall)
Barley	Attain[1] Caliber 400[1] Cobutox 600[1] 2,4-D[1] Clovitox Dyvel DS[1] Embutox 625[1] MCPA[1] SEE 2,4-DB[1] Target[1] Tropotox Plus[1]	Achieve Extra Ally Attain Buctril M 2,4-D Dichlorprop-D Estaprop MCPA SEE Diphenoprop Thumper Turboprop	Achieve Extra Afolan + MCPA Ally Assert[1] Attain Banvel/Banvel II & Mixes Buctril M Champion Extra Crossfire Curtail M 2,4-D[1] Dichlorprop-D Dyvel Dyvel DS	Estaprop Hoe-Grass II Linuron 480 + MCPA Lorox + MCPA MCPA[1] Pardner Prestige Prevail Refine Extra SEE Diphenoprop Sencor & Mixes Stampede EDF mixes Target Thumper Turboprop	Achieve Extra Afolan + MCPA Ally[1] Ally + 2,4-D Ally + MCPA Assert[1] Attain Banvel/Banvel II & Mixes Bonanza Buctril M Caliber 400 Champion Extra Champion Plus Cobutox 600 Crossfire[1] Curtail M 2,4-D[1] Dichlorprop-D Dyvel Dyvel DS	Embutox 625 Estaprop Express Pack[1] Hoe-Grass II Lontrel Linuron 480 + MCPA Lorox + MCPA MCPA[1] Pardner Prestige Prevail Refine Extra Rival 10G SEE 2,4-DB SEE Diphenoprop Stampede EDF mixes Target Thumper Treflan QR5 Turboprop Unity	Clovitox Compitox 2,4-D[1] (Creeping) MCPA Na-salt (Tall) Mecoprop Tropotox Plus[1]
Wheat	Attain[1] Caliber 400[1] Clovitox Cobutox 600[1] 2,4-D[1] Dyvel DS[1] Embutox 625[1] MCPA[1] SEE 2,4-DB Target[1] Tropotox Plus[1]	Achieve Extra Ally Attain Buctril M 2,4-D Dichlorprop-D Estaprop MCPA Puma One Pass SEE Diphenoprop Thumper Turboprop	Achieve Extra Afolan + MCPA Ally Assert[1] Attain Banvel/Banvel II & Mixes Buctril M Crossfire[2] Curtail M 2,4-D[1] Dichlorprop-D Dyvel Dyvel DS Estaprop Harmony Total	Hoe-Grass II Linuron 480 + MCPA Lorox + MCPA MCPA[1] Pardner Prestige[2] Prevail Puma One Pass Refine Extra SEE Diphenoprop Sencor & Mixes Stampede EDF mixes Target Thumper Turboprop	Achieve Extra Afolan + MCPA Ally[1] Ally + 2,4-D Ally + MCPA Amber Anthem Assert[1] Attain Banvel/Banvel II & Mixes Buctril M Caliber 400 Cobutox 600 Crossfire[1,2] Curtail M 2,4-D[1] Dichlorprop-D Dyvel Dyvel DS Embutox 625 Estaprop Express Pack[1]	Harmony Total Heritage (Fallow year) Hoe-Grass II Laser DF[3] Linuron 480 + MCPA Lontrel Lorox + MCPA MCPA[1] Pardner Prestige[2] Prevail Puma One Pass Refine Extra Rival 10G SEE 2,4-DB SEE Diphenoprop Stampede EDF mixes Target Triumph Plus[2] Thumper Turboprop Unity	Basagran[2] Clovitox Compitox 2,4-D[1] (Creeping) MCPA Na-salt (Tall) Mecoprop Tropotox Plus[1]
Oats	Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] MCPA[1] SEE 2,4-DB Target[1] Tropotox Plus[1]	Buctril M MCPA	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Curtail M Dyvel Linuron 480 + MCPA	Lorox + MCPA MCPA[1] Pardner Refine Extra Stampede EDF mixes Target	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Caliber 400 Cobutox 600 Curtail M Dyvel Embutox 625 Express Pack[1]	Linuron 480 + MCPA Lontrel Lorox + MCPA MCPA[1] Pardner Refine Extra SEE 2,4-DB Stampede EDF mixes Target	Clovitox Compitox MCPA Na-salt (Tall) Mecoprop Tropotox Plus[1]
Fall Rye (Spring Application)	Clovitox 2,4-D[1] MCPA[1] Tropotox Plus[1]	Buctril M 2,4-D MCPA	Buctril M 2,4-D[1]	MCPA[1] Pardner	Buctril M 2,4-D[1]	MCPA[1] Pardner	Clovitox 2,4-D[1] (Creeping) MCPA Na-salt (Tall) Tropotox Plus[1]
Triticale			Hoe-Grass II Pardner		Hoe-Grass II Pardner		

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[1] Suppression only

[2] All spring wheat except durum

[3] All spring wheats (including durum when tank mixed with 2,4-D ester)

[4] See page 42 for resistance information

[5] Top growth control

HERBICIDE SELECTOR CHART – CEREALS

Crop	Catchfly (Night-flowering)	Chamomile (Scentless)	Chickweed[4] (Common)	Cleavers	Cockle (Cow)		Dandelion
Barley	Achieve Extra Buctril M Dichlorprop-D Estaprop Hoe-Grass II Pardner SEE Diphenoprop Sencor Target Turboprop	Achieve Extra Ally Buctril M Curtail M Hoe-Grass II Lontrel Pardner Prestige Prevail Refine Extra	Advance 10G Afolan + MCPA Ally Attain[1] Bonanza Breaker Champion Extra Champion Plus Compitox Crossfire Linuron 480 + MCPA Lorox + MCPA Mecoprop Refine Extra Rival 10G Sencor & Mixes Treflan QR5 Unity	Attain Banvel/ Banvel II[1] Compitox Dyvel[1] Dyvel DS[1] Mecoprop Prestige Refine Extra[1] Target Unity	Achieve Extra Advance 10G Afolan + MCPA Ally Banvel/Banvel II & Mixes Bonanza Buctril M Champion Extra Champion Plus Dyvel Dyvel DS	Express Pack Hoe-Grass II Linuron 480 + MCPA Lorox + MCPA Pardner Refine Extra Rival 10G Target Thumper Treflan QR5 Unity	Afolan + MCPA Attain Cobutox 600[1] Caliber 400[1] Curtail M 2,4-D[1] Embutox 625[1] MCPA amine[1] MCPA ester[1] MCPA K-salt Prestige Prevail SEE 2,4-DB[1] SEE MCPA[1]
Wheat	Achieve Extra Buctril M Dichlorprop-D Estaprop Hoe-Grass II Pardner Puma One Pass Sencor SEE Diphenoprop Target Turboprop	Achieve Extra Ally Buctril M Curtail M Hoe-Grass II Lontrel Pardner Prestige[2] Prevail Refine Extra	Afolan + MCPA Ally Anthem Attain[1] Basagran[2] Breaker Compitox Crossfire[2] Harmony Total Laser DF[3] Linuron 480 + MCPA Lorox + MCPA Mecoprop Puma One Pass Refine Extra Sencor & Mixes Sundance Triumph Plus[2] Unity	Accord Anthem Attain Banvel/ Banvel II[1] Basagran[2] Compitox Dyvel[1] Dyvel DS[1] Mecoprop Prestige[2] Refine Extra[1] Sundance Target Unity	Achieve Extra Advance 10G (Fallow year) Afolan + MCPA Ally Amber Banvel/Banvel II & Mixes Bonanza Buctril M Dyvel Dyvel DS Express Pack Harmony Total	Heritage (Fallow year) Hoe-Grass II Laser DF[3] Linuron 480 + MCPA Lorox + MCPA Pardner Puma One Pass Refine Extra Target Thumper Triumph Plus[2] Unity	Afolan + MCPA Anthem Attain Caliber 400[1] Cobutox 600[1] Curtail M 2,4-D[1] Embutox 625[1] MCPA amine[1] MCPA ester[1] MCPA K-salt Prestige[2] Prevail SEE 2,4-DB[1] SEE MCPA[1]
Oats	Buctril M Pardner Target	Buctril M Curtail M Lontrel Pardner Refine Extra	Afolan + MCPA Compitox Linuron 480 + MCPA Lorox + MCPA Mecoprop Refine Extra	Banvel/ Banvel II[1] Compitox Dyvel[1] Mecoprop Mecoturf Refine Extra[1] Target	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Dyvel Linuron 480 + MCPA	Lorox + MCPA Pardner Refine Extra Target	Afolan + MCPA Caliber 400[1] Cobutox 600[1] Curtail M Embutox 625[1] MCPA amine[1] MCPA ester[1] MCPA K-salt SEE 2,4-DB[1] SEE MCPA[1]
Fall Rye (Spring Application)	Buctril M Pardner	Buctril M Pardner			Buctril M Pardner		2,4-D[1] MCPA amine[1] MCPA ester[1] MCPA K-salt SEE MCPA[1]
Triticale	Hoe-Grass II Pardner	Hoe-Grass II Pardner			Hoe-Grass II Pardner		

[1] Suppression only

[2] All spring wheat except durum

[3] All spring wheats (including durum when tank mixed with 2,4-D ester)

[4] See page 42 for resistance information

[5] Top growth control

HERBICIDE SELECTOR CHART – CEREALS

Crop	Darnel (Persian)	Flixweed	Foxtail[4] (Green)	Grass (Barnyard)	Grass (Quack)
Barley	Achieve Achieve Extra Advance 10G Bonanza Hoe-Grass II Hoe-Grass 284 Prevail Rival 10G Treflan QR5	Achieve Extra Ally Attain Banvel/Banvel II & Mixes Breaker Buctril M Champion Plus Curtail M Dichlorprop-D Dyvel Dyvel DS 2,4-D Estaprop Express Pack Linuron 480 + MCPA Lorox + MCPA MCPA Prestige Prevail SEE Diphenoprop Sencor Stampede EDF mixes Target Thumper Turboprop Unity	Achieve Achieve Extra Advance 10G Afolan + MCPA[1] Bonanza Champion Extra Champion Plus Fortress Hoe-Grass II Hoe-Grass 284 Lorox + MCPA[1] NaTA Prevail Puma Super Puma^{120} Super Rival 500EC/10G/DF Stampede EDF mixes Treflan	Achieve Advance 10G Bonanza Champion Extra Hoe-Grass II Hoe-Grass 284 Puma Super Puma^{120} Super Rival 10G Treflan QR5	NaTA[1]
Wheat	Achieve Achieve Extra Advance 10G (Fallow year) Heritage (Fallow year) Hoe-Grass II Hoe-Grass 284 Prevail	Achieve Extra Ally Amber Attain Banvel/Banvel II & Mixes Breaker Buctril M Curtail M 2,4-D Dichlorprop-D Dyvel Dyvel DS Estaprop Express Pack Laser DF[3] Linuron 480 + MCPA Lorox + MCPA MCPA Prestige[2] Puma One Pass SEE Diphenoprop Sencor Stampede EDF mixes Target Thumper Triumph Plus[2] Turboprop Unity	Accord Achieve Achieve Extra Advance 10G Afolan + MCPA[1] Anthem Bonanza Fortress Heritage Hoe-Grass II Hoe-Grass 284 Horizon Laser DF[3] Linuron 480 + MCPA Lorox + MCPA[1] Prevail Puma Super Puma^{120} Super Rival 500 EC/10G/DF Stampede EDF mixes Treflan Triumph Plus[2]	Accord Achieve Advance 10G Bonanza Heritage (Fallow year) Hoe-Grass II Hoe-Grass 284 Puma Super Puma^{120} Super	
Oats		Banvel/Banvel II + MCPA Buctril M Curtail M Dyvel Lorox + MCPA MCPA Stampede EDF mixes Target	Afolan + MCPA[1] Linuron 480 + MCPA Lorox + MCPA[1] NaTA Stampede EDF mixes		NaTA[1]
Fall Rye (Spring Application)	Achieve Hoe-Grass 284	Buctril M 2,4-D MCPA	Achieve Achieve Extra Hoe-Grass 284	Achieve Hoe-Grass 284	
Triticale	Achieve Hoe-Grass II Hoe-Grass 284		Achieve Hoe-Grass II Hoe-Grass 284	Hoe-Grass II Hoe-Grass 284	

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[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 42 for resistance information
[5] Top growth control

HERBICIDE SELECTOR CHART – CEREALS

Crop	Groundsel (Common)	Hawk's-beard (Narrow-leaved)	Hemp-nettle	Henbit	Horsetail (Field)	Knawel
Barley	Achieve Extra Afolan + MCPA Ally Buctril M Curtail M Hoe-Grass II Pardner Prestige Prevail Refine Extra Sencor + Mixes Thumper	Ally + 2,4-D Caliber 400 Cobutox 600 2,4-D[1] Embutox 625 Express Pack Refine Extra SEE 2,4-DB	Afolan + MCPA Ally Attain[1] Banvel/Banvel II + MCPA Champion Extra Champion Plus Clovitox Crossfire Dyvel Lorox + MCPA Linuron 480 + MCPA MCPA[1] Refine Extra Sencor + Mixes Target Tropotox Plus[1] Unity	Sencor & Mixes	Afolan + MCPA[1] Attain Caliber 400[1] Champion Plus[5] Clovitox Cobutox 600[1] 2,4-D[1] Embutox 625[1] MCPA[1] SEE 2,4-DB[1] Tropotox Plus	Hoe-Grass II Pardner
Wheat	Achieve Extra Afolan + MCPA Ally Basagran[2] Buctril M Curtail M Hoe-Grass II Pardner Prestige[2] Prevail Refine Extra Sencor + Mixes Thumper	Ally + 2,4-D Anthem Caliber 400 Cobutox 600 2,4-D[1] Embutox 625 Express Pack Refine Extra SEE 2,4-DB Stampede EDF mixes	Afolan + MCPA Ally Attain[1] Banvel/Banvel II + MCPA Clovitox Crossfire[2] Dyvel Harmony Total Laser DF[3] Lorox + MCPA Linuron 480 + MCPA MCPA[1] Refine Extra Sencor & Mixes Target Triumph Plus[2] Tropotox Plus[1] Unity	Sencor & Mixes	Afolan + MCPA[1] Attain Caliber 400[1] Clovitox Cobutox 600[1] 2,4-D[1] Embutox 625[1] Laser DF[3] MCPA[1] SEE 2,4-DB[1] Triumph Plus[1,2] Tropotox Plus	Hoe-Grass II Pardner
Oats	Afolan + MCPA Buctril M Curtail M Pardner	Caliber 400 Cobutox 600 Embutox 625 SEE 2,4-DB	Afolan + MCPA Banvel/Banvel II + MCPA Clovitox Dyvel Linuron 480 + MCPA Lorox + MCPA MCPA[1] Refine Extra Target Tropotox Plus		Afolan + MCPA[1] Caliber[1] Clovitox Cobutox 600[1] Embutox 625[1] MCPA[1] SEE 2,4-DB[1] Tropotox Plus	Pardner
Fall Rye (Spring Application)	Buctril M Pardner	2,4-D[1]	Clovitox MCPA[1] Tropotox Plus		Clovitox 2,4-D[1] MCPA[1] Tropotox Plus	Pardner
Triticale	Hoe-Grass II Pardner					Hoe-Grass II Pardner

[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 42 for resistance information
[5] Top growth control

HERBICIDE SELECTOR CHART – CEREALS

Crop	Knotweed	Kochia[4]		Lamb's-quarters		Mustards, Rapeseed (Vol.)	
Barley	Advance 10G Bonanza Dyvel DS Rival 10G Target Treflan	Achieve Extra Afolan + MCPA Ally Attain Banvel/Banvel II & Mixes Breaker Buctril M Champion Extra Champion Plus Curtail M[1] 2,4-D Dichlorprop-D Dyvel Dyvel DS Estaprop Express Pack	Hoe-Grass II MCPA amine MCPA ester MCPA K-salt Pardner Prestige Prevail Refine Extra SEE Diphenoprop SEE MCPA Stampede EDF mixes Target Thumper Turboprop Unity	Achieve Extra Advance 10G Afolan + MCPA Ally[1] Ally + 2,4-D Ally + MCPA Attain Banvel/Banvel II & Mixes Bonanza Breaker Buctril M Caliber 400 Champion Extra Champion Plus Clovitox Cobutox 600 Crossfire Curtail M 2,4-D Dichlorprop-D Dyvel Dyvel DS	Embutox 625 Estaprop Express Pack Hoe-Grass II Linuron 480 + MCPA Lorox + MCPA MCPA Pardner Prestige Prevail Refine Extra Rival 10G SEE 2,4-DB SEE Diphenoprop Sencor & Mixes Stampede EDF mixes Target Thumper Tropotox Plus Treflan QR5 Turboprop Unity	Achieve Extra Afolan + MCPA Ally Assert Attain Banvel/Banvel II & Mixes Breaker Buctril M Caliber 400 Champion Extra Champion Plus Clovitox Cobutox 600 Crossfire Curtail M 2,4-D Dichlorprop-D Dyvel Dyvel DS	Embutox 625 Estaprop Express Pack Hoe-Grass II MCPA Pardner Prestige Prevail Refine Extra SEE 2,4-DB SEE Diphenoprop Sencor + Mixes Stampede EDF mixes Target Thumper Tropotox Plus Turboprop Unity
Wheat	Dyvel DS Target	Achieve Extra Afolan + MCPA Ally Amber Anthem Attain Banvel/Banvel II & Mixes Breaker Buctril M Curtail M[1] 2,4-D Dichlorprop-D Dyvel Dyvel DS Estaprop Express Pack Harmony Total Hoe-Grass II	Laser DF[3] MCPA amine MCPA ester MCPA K-salt Pardner Prestige[2] Prevail Puma One Pass Refine Extra SEE Diphenoprop SEE MCPA Stampede EDF mixes Target Thumper Triumph Plus[2] Turboprop Unity	Achieve Extra Afolan + MCPA Ally[1] Ally + 2,4-D Ally + MCPA Amber[1] Anthem Attain Banvel/Banvel II & Mixes Basagran[2] Breaker Buctril M Caliber 400 Clovitox Cobutox 600 Crossfire[2] Curtail M 2,4-D Dichlorprop-D Dyvel Dyvel DS Lorox + MCPA Embutox 625 Estaprop	Express Pack Harmony Total Heritage Hoe-Grass II Laser DF[3] Linuron 480 + MCPA MCPA Pardner Prestige[2] Prevail Puma One Pass Refine Extra Rival 10G (Fallow year) SEE 2,4-DB SEE Diphenoprop 600 Sencor & Mixes Stampede EDF mixes Target Thumper Triumph Plus[2] Tropotox Plus Turboprop Unity	Achieve Extra Afolan + MCPA Ally Amber Anthem Assert Attain Banvel/Banvel II & Mixes Basagran[2] Breaker Buctril M Caliber 400 Clovitox Cobutox 600 Crossfire[2] Curtail M 2,4-D Dichlorprop-D Dyvel Dyvel DS Embutox 625 Estaprop	Express Pack Harmony Total Hoe-Grass II Laser DF[3] MCPA Pardner Prestige[2] Prevail Puma One Pass Refine Extra SEE 2,4-DB SEE Diphenoprop Sencor & Mixes Stampede EDF mixes Sundance Target Thumper Triumph Plus[2] Tropotox Plus Turboprop Unity
Oats	Target	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Curtail M[1] Dyvel MCPA amine MCPA ester	MCPA K-salt Pardner Refine Extra SEE MCPA Stampede EDF mixes Target	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Caliber 400 Clovitox Cobutox 600 Curtail M Dyvel Embutox 625	Linuron 480 + MCPA Lorox + MCPA MCPA Pardner Refine Extra SEE 2,4-DB Stampede EDF mixes Target Tropotox Plus	Afolan + MCPA Banvel/Banvel II & Mixes Buctril M Caliber 400 Clovitox Cobutox 600 Curtail M Dyvel	Embutox 625 MCPA Pardner Refine Extra SEE 2,4-DB Stampede EDF mixes Target Tropotox Plus
Fall Rye (Spring Application)		Buctril M 2,4-D MCPA amine MCPA ester	MCPA K-salt Pardner SEE MCPA	Buctril M Clovitox 2,4-D	MCPA Pardner Tropotox Plus	Buctril M Clovitox 2,4-D	MCPA Pardner Tropotox Plus
Triticale		Hoe-Grass II Pardner		Hoe-Grass II Pardner		Hoe-Grass II Pardner	

[1] Suppression only

[2] All spring wheat except durum

[3] All spring wheats (including durum when tank mixed with 2,4-D ester)

[4] See page 42 for resistance information

[5] Top growth control

HERBICIDE SELECTOR CHART – CEREALS

Crop	Nightshade (American, Black, Hairy)	Oats[4] (Wild, Vol.)	Pigweed (Prostrate)	Pigweed (Redroot)			Pigweed (Russian)
Barley	Achieve Extra (American) Buctril M (American) Mecoprop Pardner (American) (Black) Thumper (American)	Achieve Achieve Extra Advance 10G Assert Avadex BW Avenge Bonanza Champion Extra Champion Plus Fortress Hoe-Grass II Hoe-Grass 284 Prevail Puma Super Puma^{120} Super Rival 10G Treflan QR5	Advance 10G Afolan + MCPA Ally Banvel/Banvel II & Mixes Bonanza 2,4-D Dyvel Dyvel DS MCPA-K Rival 10G Target Treflan QR5	Achieve Extra Advance 10G Afolan + MCPA Ally Attain Banvel/Banvel II & Mixes Breaker Buctril M Caliber 400 Champion Extra Champion Plus Clovitox Cobutox 600 Curtail M 2,4-D	Dichlorprop-D Dyvel Dyvel DS Embutox 625 Estaprop Express Pack Hoe-Grass II Linuron 480 + MCPA Lorox + MCPA MCPA amine MCPA ester[1] MCPA K-salt MCPA Na-salt Pardner Prestige	Prevail Refine Extra Rival 10G SEE 2,4-DB SEE Diphenoprop SEE MCPA[1] Sencor & Mixes Stampede EDF mixes Target Thumper Treflan QR5 Trifluralin 10G Tropotox Plus Turboprop Unity	Afolan + MCPA amine Ally + MCPA Ally + 2,4-D Banvel/Banvel II & Mixes Breaker Champion Plus Curtail M 2,4-D Dichlorprop-D Dyvel Estaprop Express Pack MCPA Prevail Refine Extra SEE Diphencprop Turboprop
Wheat	Achieve Extra (American) Basagran[2] (Hairy) Buctril M (American) Pardner (American) (Black) Puma One Pass Thumper (American)	Achieve Achieve Extra Advance 10G (Fallow year) Anthem Assert Avadex BW Avenge Fortress Harmony Total Heritage (Fallow year) Hoe-Grass II Hoe-Grass 284 Horizon Mataven L Prevail Puma Super Puma^{120} Super Rival 10G[1] (Fallow year) Sundance Triumph Plus[2]	Afolan + MCPA Ally Banvel/Banvel II & Mixes 2,4-D Dyvel Dyvel DS MCPA-K Target	Achieve Extra Advance 10G (Fallow year) Afolan + MCPA Ally Amber Anthem Attain Banvel/Banvel II & Mixes Breaker Buctril M Caliber 400 Clovitox Cobutox 600 Curtail M 2,4-D Dichlorprop-D	Dyvel Dyvel DS Embutox 625 Estaprop Express Pack Harmony Total Heritage (Fallow year) Laser DF[3] Linuron 480 + MCPA Lorox + MCPA MCPA amine MCPA ester[1] MCPA K-salt MCPA Na-salt Pardner	Prestige[2] Prevail Puma One Pass Refine Extra SEE 2,4-DB SEE Diphenoprop SEE MCPA[1] Sencor & Mixes Stampede EDF mixes Sundance Target Thumper Triumph Plus[2] Tropotox Plus Turboprop Unity	Afolan + MCPA amine Ally + MCPA Ally + 2,4-D Banvel/Banvel II & Mixes Breaker Curtail M 2,4-D Dichlorprop-D Dyvel Estaprop Express Pack Laser DF[3] MCPA Prevail Refine Extra Stampede EDF mixes SEE Diphenoprop Triumph Plus[2] Turboprop
Oats	Buctril M (American) Pardner (American) (Black)		Afolan + MCPA Banvel/Banvel II + MCPA Dyvel MCPA-K Target	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Caliber 400 Clovitox Cobutox 600 Curtail M Dyvel	Embutox 625 Linuron 480 + MCPA Lorox + MCPA MCPA amine MCPA ester[1] MCPA K-salt MCPA Na-salt	Pardner Refine Extra SEE 2,4-DB SEE MCPA[1] Stampede EDF mixes Target Tropotox Plus	Afolan + MCPA amine Banvel/Banvel II + MCPA Curtail M Dyvel MCPA Refine Extra Stampede EDF mixes
Fall Rye (Spring Application)	Buctril M (American) Pardner (American) (Black)	Achieve Achieve Extra Avenge Hoe-Grass 284	2,4-D MCPA-K	Buctril M Clovitox 2,4-D MCPA amine	MCPA ester[1] MCPA K-salt MCPA Na-salt	Pardner SEE MCPA Tropotox Plus	2,4-D MCPA
Triticale	Pardner (American) (Black)	Achieve Avenge Hoe-Grass II Hoe-Grass 284 Mataven L		Hoe-Grass II Pardner			

[1] Suppression only

[2] All spring wheat except durum

[3] All spring wheats (including durum when tank mixed with 2,4-D ester)

[4] See page 42 for resistance information

[5] Top growth control

HERBICIDE SELECTOR CHART – CEREALS

Crop	Radish (Wild)	Ragweed		Shepherd's-purse	
Barley	Afolan + MCPA Attain Banvel/Banvel II & Mixes Champion Plus Clovitox Dyvel Express Pack 2,4-D MCPA Tropotox Plus[1]	Achieve Extra Afolan + MCPA Attain Banvel/Banvel II & Mixes Breaker Buctril M Caliber 400 Clovitox Cobutox 600 Champion Plus 2,4-D Dichlorprop-D Dyvel	Dyvel DS Embutox 625 Estaprop Linuron 480 + MCPA Lorox + MCPA MCPA Pardner SEE 2,4-DB SEE Diphenoprop Target Thumper Tropotox Plus Turboprop	Achieve Extra Afolan + MCPA Ally Attain Banvel/Banvel II & Mixes Breaker Buctril M Caliber 400 Champion Extra Champion Plus Clovitox Cobutox 600 Curtail M Dichlorprop-D Dyvel Dyvel DS 2,4-D Embutox 625	Estaprop Express Pack Linuron 480 + MCPA Lorox + MCPA MCPA Prestige Prevail Refine Extra SEE 2,4-DB SEE Diphenoprop Sencor + Mixes Stampede EDF mixes Target Thumper Tropotox Plus Turboprop Unity
Wheat	Afolan + MCPA Attain Banvel/Banvel II & Mixes Basagran[2] Clovitox 2,4-D Dyvel Express Pack Laser DF[3] MCPA Stampede EDF mixes Triumph Plus[2] Tropotox Plus[1]	Achieve Extra Afolan + MCPA Attain Banvel/Banvel II & Mixes Basagran[2] Breaker Buctril M Caliber 400 Clovitox Cobutox 600 Dichlorprop-D Dyvel Dyvel DS 2,4-D Embutox 625	Estaprop Laser DF[3] Linuron 480 + MCPA Lorox + MCPA MCPA Pardner Puma One Pass SEE 2,4-DB SEE Diphenoprop Target Thumper Triumph Plus[2] Tropotox Plus Turboprop	Achieve Extra Afolan + MCPA Ally Attain Banvel/Banvel II & Mixes Basagran[2] Breaker Buctril M Caliber 400 Clovitox Cobutox 600 Curtail M 2,4-D Dichlorprop-D Dyvel Dyvel DS Embutox 625 Estaprop Express Pack	Harmony Total Laser DF[3] Linuron 480 + MCPA Lorox + MCPA MCPA Prestige[2] Prevail Puma One Pass Refine Extra SEE 2,4-DB SEE Diphenoprop Sencor + Mixes Stampede EDF mixes Target Thumper Triumph Plus[2] Tropotox Plus Turboprop Unity
Oats	Afolan + MCPA Banvel/Banvel II + MCPA Clovitox Dyvel MCPA Tropotox Plus[1]	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Caliber 400 Clovitox Cobutox 600 Dyvel	Embutox 625 Linuron 480 + MCPA Lorox + MCPA MCPA Pardner Target Tropotox Plus	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Caliber 400 Clovitox Cobutox 600 Curtail M Dyvel Embutox 625	Linuron 480 + MCPA Lorox + MCPA MCPA Refine Extra SEE 2,4-DB Stampede EDF mixes Target Tropotox Plus
Fall Rye (Spring Application)	Clovitox 2,4-D MCPA Tropotox Plus	Clovitox 2,4-D MCPA	Pardner Tropotox Plus	Buctril M Clovitox 2,4-D	MCPA Tropotox Plus
Triticale					

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[1] Suppression only

[2] All spring wheat except durum

[3] All spring wheats (including durum when tank mixed with 2,4-D ester)

[4] See page 42 for resistance information

[5] Top growth control

HERBICIDE SELECTOR CHART – CEREALS

Crop	Smartweed (Annual)		Sow-thistles (Ann. & Per.)		Spurge (Leafy)	Spurry (Corn)	Stinkweed	
Barley	Achieve Extra Afolan + MCPA Ally Attain Banvel/Banvel II & Mixes Breaker Buctril M Caliber 400[1] Champiion Extra Champion Plus Cobutox 600[1] Crossfire Curtail M Dichlorprop-D Dyvel Dyvel DS 2,4-D Embutox 625[1] Estaprop Hoe-Grass II	Linuron 480 + MCPA Lorox + MCPA MCPA amine[1] MCPA ester[1] MCPA K-salt MCPA Na-salt Pardner Prestige Prevail Refine Extra SEE 2,4-DB[1] SEE Diphenoprop SEE MCPA[1] Sencor & Mixes Stampede EDF mixes Target Thumper Turboprop Unity	Achieve Extra[1] (Per) Afolan + MCPA (Per-seedlings) Ally[1] Attain[1] Banvel[1] Banvel/Banvel II[1] & Mixes (Per) Buctril M[1] (Per) Caliber 400[1] (Per) Clovitox Cobutox 600[1] (Per) Crossfire (Ann)[1] Curtail M Dichlorprop-D Dyvel[1] Dyvel DS (Ann.)	2,4-D[1] Embutox 625[1] (Per) Estaprop (Ann)[1] Estaprop[1] (Per) Lsontrel[1] (Per) MCPA[1] Prestige Prevail Refine Extra[1] SEE 2,4-DB[1] (Per) SEE Diphenoprop Sencor Mixes[1] Target (Ann) Target[1] (Per) Tropotox Plus[1] Turboprop[1]	Attain[1] 2,4-D[1] MCPA[1]	Afolan + MCPA Ally Banvel/Banvel II & Mixes Champion Extra Champion Plus Compitox Crossfire Dyvel Dyvel DS Linuron 480 + MCPA Lorox + MCPA Mecoprop Refine Extra Sencor & Mixes Target	Achieve Extra Afolan + MCPA Ally Assert Attain Banvel/Banvel II & Mixes Breaker Buctril M Caliber 400 Champion Extra Champion Plus Clovitox Cobutox 600 Crossfire Curtail M 2,4-D Dichlorprop-D Dyvel Dyvel DS Embutox 625	Estaprop Express Pack Hoe-Grass II Linuron 480 + MCPA (Barley, wheat, oats) Lorox + MCPA MCPA Pardner Prestige Prevail Refine Extra SEE 2,4-DB Sencor & Mixes Stampede EDF mixes Target Thumper Tropotox Plus Turboprop Unity
Wheat	Achieve Extra Afolan + MCPA Ally Anthem Attain Banvel/Banvel II & Mixes Basagran[2] Breaker Buctril M Caliber 400[1] Cobutox 600[1] Crossfire[2] Curtail M Dichlorprop-D Dyvel Dyvel DS 2,4-D Embutox 625[1] Estaprop Harmony Total Hoe-Grass II Laser DF[3]	Linuron 480 + MCPA Lorox + MCPA MCPA amine[1] MCPA ester[1] MCPA K-salt MCPA Na-salt Pardner Prestige[2] Prevail Puma One Pass Refine Extra SEE 2,4-DB[1] SEE Diphenoprop SEE MCPA[1] Sencor & Mixes Stampede EDF mixes Target Thumper Triumph Plus Turboprop Unity	Achieve Extra[1] (Per) Afolan + MCPA (Per-seedlings) Ally[1] Anthem Attain[1] Banvel[1] Banvel/Banvel II[1] & Mixes (Per) Buctril M[1] Caliber 400[1] (Per) Clovitox Cobutox 600[1] (Per) Crossfire (Ann)[1,2] Curtail M Dichlorprop-D Dyvel[1] Dyvel DS (Ann.)	2,4-D[1] Embutox 625[1] (Per) Estaprop[1] (Ann) Estaprop[1] (Per) Harmony Total[1] Lontrel[1] (Per) MCPA[1] Prestige[2] Prevail Refine Extra[1] SEE 2,-4DB[1] (Per) SEE Diphenoprop Sencor Mixes[1] Target (Ann) Target[1] (Per) Tropotox Plus[1] Turboprop[1]	Attain[1] 2,4-D[1] MCPA[1]	Afolan + MCPA Ally Anthem Banvel/Banvel II & Mixes Basagran[2] Compitox Crossfire[2] Dyvel Dyvel DS Harmony Total Laser DF[3] Linuron 480 + MCPA Lorox + MCPA Mecoprop Refine Extra Sencor & Mixes Target Triumph Plus[2]	Achieve Extra Afolan + MCPA Ally Amber Assert Attain Banvel/Banvel II & Mixes Basagran[2] Breaker Buctril M Caliber 400 Clovitox Cobutox 600 Crossfire[2] Curtail M 2,4-D Dichlorprop-D Dyvel Dyvel DS Embutox 625 Estaprop	Express Pack Harmony Total Hoe-Grass II Laser DF[3] Lorox + MCPA MCPA Pardner Prestige[2] Prevail Puma One Pass Refine Extra SEE 2,4-DB Sencor & Mixes Stampede EDF mixes Sundance Target Thumper Triumph Plus[2] Tropotox Plus Turboprop Unity
Oats	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Caliber 400[1] Clovitox Cobutox 600[1] Curtail M Dyvel Embutox 625[1] Linuron 480 + MCPA	Lorox + MCPA MCPA amine[1] MCPA ester[1] MCPA K-salt MCPA Na-salt Refine Extra SEE 2,4-DB[1] SEE MCPA[1] Stampede EDF mixes Target Tropotox Plus	Afolan + MCPA (Per-seedlings) Banvel/Banvel II[1] + MCPA (Per) Buctril M[1] (Per) Caliber 400[1] (Per) Clovitox Cobutox 600[1] (Per) Curtail M Dyvel[1]	Dyvel DS (Ann) Embutox 625[1] (Per) Lontrel[1] (Per) MCPA[1] Refine Extra[1] SEE 2,4-DB[1](Per) Target (Ann) Target[1] (Per) Tropotox Plus[1]	MCPA[1]	Afolan + MCPA Banvel/Banvel II + MCPA Compitox Dyvel Linuron 480 + MCPA Lorox + MCPA Mecoprop Refine Extra Reglone Target	Afolan + MCPA Banvel/Banvel II + MCPA Buctril M Caliber 400 Clovitox Cobutox 600 Curtail M Dyvel Embutox 625	Lorox + MCPA MCPA Pardner Refine Extra SEE 2,4-DB Stampede EDF mixes Target Triumph Tropotox Plus
Fall Rye (Spring Application)	Buctril M 2,4-D MCPA amine[1] MCPA ester[1]	MCPA K-salt MCPA Na-salt Pardner SEE MCPA[1]	Buctril M[1] (Per) Clovitox 2,4-D[1]	MCPA[1] MCPA K-salt (Per) Tropotox Plus[1]	2,4-D[1] MCPA[1]	MCPA K-salt	Buctril M Clovitox 2,4-D	MCPA Pardner Tropotox Plus
Triticale	Hoe-Grass II Pardner						Hoe-Grass II Pardner	

[1] Suppression only

[2] All spring wheat except durum

[3] All spring wheats (including durum when tank mixed with 2,4-D ester)

[4] See page 42 for resistance information

[5] Top growth control

HERBICIDE SELECTOR CHART – CEREALS

Crop	Stork's-bill	Thistle (Canada)		Thistle[4] (Russian)		Toadflax
Barley	Afolan + MCPA Ally Attain Dichlorprop-D Estaprop Linuron 480 + MCPA Lorox + MCPA Refine Extra[1] SEE Diphenoprop Turboprop	Achieve Extra Ally[1] Ally + 2,4-D Attain[1] Banvel[1] Banvel/Banvel II & Mixes Buctril M[1] Caliber 400[1] Clovitox Cobutox 600[1] Compitox[1] Crossfire[5] Curtail M Dichlorprop-D Dyvel[1] Dyvel DS[1]	2,4-D[1] Embutox 625[1] Estaprop[1] Express Pack[5] Lontrel Lorox + MCPA[1] MCPA[1] Mecoprop[1] Prevail Refine Extra[5] SEE 2,4-DB[1] SEE Diphenoprop[1] Sencor & Mixes[1] Target[1] Tropotox Plus[1] Turboprop[1]	Achieve Extra Ally[1] Ally + 2,4-D Ally + MCPA Attain Banvel/Banvel II + 2,4-D Bonanza Buctril M Champion Extra Champion Plus 2,4-D Dichlorprop-D	Dyvel Dyvel DS Estaprop Express Pack Hoe-Grass II Pardner Refine Extra Rival 10G SEE Diphenoprop Sencor Mixes Target Thumper Turboprop	Ally[1] Estaprop[1] Refine Extra[1] SEE Diphenoprop[1] Turboprop[1]
Wheat	Afolan + MCPA Ally Anthem Attain Basagran[2] Dichlorprop-D Estaprop Linuron 480 + MCPA Lorox + MCPA Refine Extra[1] SEE Diphenoprop Turboprop	Achieve Extra Ally[1] Ally + 2,4-D Attain[1] Banvel[1] Banvel/Banvel II[1] & Mixes Buctril M[1] Caliber 400[1] Clovitox Cobutox 600[1] Compitox[1] Crossfire[5,2] Curtail M Dichlorprop-D Dyvel[1] Dyvel DS[1] 2,4-D[1]	Embutox 625[1] Estaprop[1] Express Pack[5] Lontrel Lorox + MCPA[1] MCPA[1] Mecoprop[1] Prevail Refine Extra[5] SEE 2,4-DB[1] SEE Diphenoprop[1] Sencor & Mixes[1] Target[1] Triumph Plus[1] Tropotox Plus[1] Turboprop[1]	Achieve Extra Advance 10G (Fallow year) Ally[1] Ally + 2,4-D Ally + MCPA Amber Attain Banvel/Banvel II + 2,4-D Basagran[2] Buctril M 2,4-D Dichlorprop-D Dyvel Dyvel DS Estaprop	Express Pack Harmony Total Heritage (Fallow year) Hoe-Grass II Laser DF[3] Pardner Prestige Puma One Pass Refine Extra SEE Diphenoprop Sencor Mixes Target Thumper Triumph Plus[2] Turboprop	Ally[1] Estaprop[1] Refine Extra[1] SEE Diphenoprop[1] Turboprop[1]
Oats	Afolan + MCPA Linuron 480 + MCPA Lorox + MCPA Refine Extra[1]	Banvel/Banvel II[1] + MCPA Buctril M[1] Caliber 400[1] Clovitox Cobutox 600[1] Compitox[1] Dyvel[1] Embutox 625[1]	Lontrel Lorox + MCPA[1] MCPA[1] Mecoprop[1] Refine Extra[5] SEE 2,4-DB[1] Target[1] Tropotox Plus[1]	Buctril M Dyvel Pardner	Refine Target	Refine Extra[1]
Fall Rye (Spring Application)		Buctril M[1] Clovitox 2,4-D[1]	MCPA[1] Tropotox Plus[1]	2,4-D	Pardner	
Triticale				Hoe-Grass II Pardner		

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[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 42 for resistance information
[5] Top growth control

HERBICIDE SELECTOR CHART – OILSEEDS

Crop	Bindweeds	Bluebur	Buckwheat (Tartary)	Buckwheat (Wild)	Buttercup (Creeping, Tall)	Catchfly (Night-flowering)	Chamomile (Scentless)
Canola **(TTC - triazine tolerant canola)** **(RR - Roundup Ready Canola)** **(ST - SMART Canola)** **(Liberty Link Canola)**	Reglone[3] Roundup (RR)	Reglone[3]	Reglone[3] Sencor (TTC)	Advance 10G Bladex (TTC) Bonanza Edge Freedom Gold Liberty Link Lontrel Odyssey (ST) Pursuit Reglone[3] Rival Roundup (RR) Treflan	Reglone[3]	Reglone[3] Sencor (TTC)	Liberty Link Lontrel Reglone[3]
Flax	Basagran MCPA[1] Reglone[3]	Buctril M MCPA[1] Reglone[3]	Buctril M Hoe-Grass II MCPA[1] Poast Flaxmax Reglone[3] Stampede EDF	Advance 10G Bonanza Buctril M Hoe-Grass II Lontrel Poast Flaxmax Rival Stampede EDF Treflan	Basagran 2,4-D[1] (Creeping) MCPA Na-salt (Tall) Reglone[3]	Buctril M Hoe-Grass II Reglone[3]	Buctril M Hoe-Grass II Lontrel Poast Flaxmax Reglone[3]
Mustard	Reglone[3]	Reglone[3]	Reglone[3]	Advance 10G Bonanza Edge Reglone[3] Rival Treflan	Reglone[3]	Reglone[3]	Reglone[3]
Sunflowers			Reglone[3]	Advance 10G Bonanza Edge Reglone[3] Rival Treflan	Reglone[3]	Reglone[3]	

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[1] Suppression only

[2] Pre-crop emergence to weed seedlings

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OILSEEDS

Crop	Chickweed[4] (Common)	Cleavers	Cockle (Cow)	Dandelion	Darnel (Persian)	Flixweed	Foxtail[4] (Green)
Canola (TTC - triazine tolerant canola) **(RR - Roundup Ready Canola)** **(ST - SMART Canola)** **(Liberty Link Canola)**	Advance 10G Bladex (TTC) Bonanza Edge Freedom Gold Liberty Link Odyssey (ST) Rival Roundup (RR) Sencor (TTC) Treflan	Bladex (TTC) Edge[1] Liberty Link Odyssey (ST) Pursuit Reglone[3] Roundup (RR)	Advance 10G Bonanza Edge Freedom Gold Liberty Link Reglone[3] Rival Roundup (RR) Treflan	Liberty Link Reglone[3] Roundup (RR)	Advance 10G Bonanza Fusion Hoe-Grass 284 Odyssey (ST) Poast Ultra Reglone[3] Rival Roundup (RR) Select Treflan Venture DG	Liberty Link Muster[5] Muster Gold Odyssey (ST) Reglone[3] Roundup (RR) Sencor (TTC)	Advance 10G Assure II Bonanza Edge Fortress Freedom Gold Fusion Hoe-Grass 284 Liberty Link Muster Muster Gold NaTA Odyssey (ST) Poast Ultra Rival Roundup (RR) Select Treflan Venture DG
Flax	Advance 10G Basagran Bonanza Eptam Rival Treflan	Reglone[3]	Advance 10G Bonanza Buctril M Hoe-Grass II Reglone[3] Rival Treflan	MCPA amine[1] MCPA ester[1] MCPA K-salt Poast Flaxmax[5] Reglone[3]	Advance 10G Bonanza Fusion Hoe-Grass II Hoe-Grass 284 Poast Flaxmax Poast Ultra Reglone[3] Rival Select Treflan Venture DG	Blagal Buctril M MCPA Poast Flaxmax[5] Reglone[3] Stampede EDF	Advance 10G Assure II Bonanza Eptam Fortress Fusion Hoe-Grass II Hoe-Grass 284 NaTA Poast Flaxmax Poast Ultra Rival Select Stampede EDF Treflan Venture DG
Mustard	Advance 10G Bonanza Edge Rival Treflan	Reglone[3] Edge[1]	Advance 10G Bonanza Edge Reglone[3] Rival Treflan	Reglone[3]	Advance 10G Bonanza Fusion Hoe-Grass 284 Reglone[3] Rival Select Treflan Venture DG	Reglone[3]	Advance 10G Bonanza Edge Fortress Fusion Hoe-Grass 284 Rival Select Treflan Venture
Sunflowers	Advance 10G Bonanza Edge Eptam Rival Treflan		Advance 10G Bonanza Edge Reglone[3] Rival Treflan		Advance 10G Bonanza Hoe-Grass 284 Reglone[3] Rival Select Treflan Venture DG		Advance 10G Bonanza Edge Eptam Hoe-Grass 284 Rival Select Treflan Venture

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[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] See page 42 for resistance information
[5] Spring seedlings

HERBICIDE SELECTOR CHART – OILSEEDS

Crop	Grass (Barnyard)	Grass (Quack)	Groundsel (Common)	Hawk's-beard (Narrow-leaved)	Hemp-nettle	Henbit	Horsetail (Field)
Canola (TTC - triazine tolerant canola) **(RR - Roundup Ready Canola)** **(ST - SMART Canola)** **(Liberty Link Canola)**	Advance 10G Assure II Bonanza Edge Freedom Gold Fusion Hoe-Grass 284 Liberty Link Muster Muster Gold Odyssey (ST) Poast Ultra Reglone[3] Rival Roundup (RR) Select Treflan Venture DG	Assure II Liberty Link[1] NaTA Poast Ultra Reglone[3] Roundup (RR) Select Venture DG[1]	Bladex (TTC) Reglone[3] Sencor (TTC)	Reglone[3] Roundup (RR)	Bladex (TTC) Edge[1] Freedom Gold Liberty Link Muster Muster Gold Odyssey (ST) Pursuit Reglone[3] Roundup (RR) Sencor (TTC)	Reglone[3] Sencor (TTC)	Reglone[3]
Flax	Advance 10G Assure II Bonanza Eptam Fusion Hoe-Grass II Hoe-Grass 284 Poast Flaxmax Poast Ultra Reglone[3] Rival Select Treflan Venture DG	Assure II Eptam NaTA[1] Poast Ultra Reglone[3] Select Venture DG[1]	Basagran Buctril M Hoe-Grass II Poast Flaxmax Reglone[3]	Reglone[3]	MCPA[1] Reglone[3]	Eptam Reglone[3]	MCPA[1] Reglone[3]
Mustard	Advance 10G Bonanza Edge Fusion Hoe-Grass 284 Reglone[3] Rival Select Treflan Venture DG	Reglone[3] Select Venture DG[1]	Reglone[3]	Reglone[3]	Edge[1] Reglone[3]	Reglone[3]	Reglone[3]
Sunflowers	Advance 10G Bonanza Edge Eptam Hoe-Grass 284 Reglone[3] Rival Select Treflan Venture DG	Eptam Reglone[3] Select Venture DG[1]	Reglone[3]		Edge[1] Reglone[3]	Eptam Reglone[3]	

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[1] Suppression only

[2] Pre-crop emergence to weed seedlings

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OILSEEDS

Crop	Knawel	Knotweed	Kochia	Lamb's-quarters	Mustards, Rapeseed (Vol.)	Nightshade (American, Black, Hairy)	Oats[4] (Wild, Vol.)
Canola **(TTC - triazine tolerant canola)** **(RR - Roundup Ready Canola)** **(ST - SMART Canola)** **(Liberty Link Canola)**	Reglone[3]	Advance 10G Bonanza Reglone[3] Rival Treflan	Edge Liberty Link Odyssey (ST) Reglone[3] Roundup (RR)	Advance 10G Bladex (TTC) Bonanza Edge Freedom Gold Liberty Link Odyssey[1] (ST) Reglone[3] Rival Roundup (RR) Sencor (TTC) Treflan	Bladex (TTC) Freedom Gold Liberty Link Muster Muster Gold Pursuit Odyssey (ST) Reglone[3] Roundup (RR) Sencor (TTC)	Edge[1] (American)[1] (Black)[1] Reglone[3]	Advance 10G Assure II Avadex BW Bonanza Edge Fortress Freedom Gold Fusion Hoe-Grass 284 Liberty Link Muster Muster Gold Odyssey (ST) Poast Flaxmax Poast Ultra Rival Roundup (RR) Select Treflan Venture DG
Flax	Hoe-Grass II Reglone[3]	Advance 10G Bonanza Rival Treflan	Buctril M Hoe-Grass II MCPA amine MCPA ester MCPA K-salt Reglone[3] Stampede EDF	Advance 10G Bonanza Basagran Buctril M Eptam Hoe-Grass II MCPA Poast Flaxmax Reglone[3] Rival Stampede EDF Treflan	Basagran Buctril M Hoe-Grass II MCPA Poast Flaxmax Reglone[3] Stampede EDF	Basagran (Hairy) Buctril M (American) Eptam (Hairy) Reglone[3]	Advance 10G Assure II Avadex BW Bonanza Eptam Fortress Fusion Hoe-Grass II Hoe-Grass 284 Poast Ultra Rival Select Treflan Venture DG
Mustard	Reglone[3]	Advance 10G Bonanza Reglone[3] Rival Treflan	Edge Reglone[3]	Advansce 10G Bonanza Edge Reglone[3] Rival Treflan	Reglone[3]	Edge[1] (American)[1] (Black)[1] Reglone[3]	Advance 10G Avadex BW Bonanza Edge Fortress Fusion Hoe-Grass 284 Rival Select Treflan Venture DG
Sunflowers		Advance 10G Bonanza Reglone[3] Rival Treflan	Edge Reglone[3]	Advance 10G Bonanza Edge Eptam Reglone[3] Rival Treflan	Assert Reglone[3]	Edge[1](American)[1] (Black)[1] Eptam (Hairy) Reglone[3]	Advance 10G Bonanza Edge Eptam Hoe-Grass 284 Mataven L Rival Select Treflan Venture DG

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[1] Suppression only

[2] Pre-crop emergence to weed seedlings

[3] Used as a crop desiccant

[4] See page 42 for resistance information

HERBICIDE SELECTOR CHART – OILSEEDS

Crop	Pigweed Prostrate	Pigweed (Redroot)	Pigweed (Russian)	Radish (Wild)	Ragweed	Shepherd's-purse	Smartweed (Annual)
Canola **(TTC - triazine tolerant canola)** **(RR - Roundup Ready Canola)** **(ST - SMART Canola)** **(Liberty Link Canola)**	Edge Reglone[3]	Bladex (TTC) Edge Freedom Gold Liberty Link Muster Odyssey (ST) Pursuit Reglone[3] Roundup (RR) Sencor (TTC)	Edge Freedom Gold Reglone[3] Sencor (TTC)	Reglone[3] Sencor (TTC)	Reglone[3] Roundup (RR)	Bladex (TTC) Liberty Link Odyssey (ST) Pursuit Reglone[3] Roundup (RR) Sencor (TTC)	Bladex (TTC) Edge[1] Freedom Gold Liberty Link Muster Muster Gold Odyssey (ST) Pursuit Reglone[3] Roundup (RR) Sencor (TTC)
Flax	Eptam (ppi) MCPA K-salt Reglone[3]	Basagran Eptam (ppi) Hoe-Grass II MCPA ester[1] MCPA K-salt MCPA Na-salt Poast Flaxmax Reglone[3]	Poast Flaxmax Reglone[3]	Basagran Hoe-Grass II MCPA Reglone[3] Stampede EDF	Basagran Buctril M MCPA Reglone[3]	Basagran Buctril M MCPA[1] Poast Flaxmax Reglone[3]	Basagran Buctril M 2,4-D[1] Hoe-Grass II MCPA amine[1] MCPA ester[1] Poast Flaxmax Reglone[3]
Mustard	Edge Reglone[3]	Edge Reglone[3]	Edge Reglone[3]	Reglone[3]	Reglone[3]	Reglone[3]	Edge[1] Reglone[3]
Sunflowers	Edge Eptam Reglone[3]	Edge Eptam (ppi)	Edge Reglone[3]	Reglone[3]		Reglone[3]	Edge[1] Reglone[3]

[1] Suppression only

[2] Pre-crop emergence to weed seedlings

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OILSEEDS

Crop	Sow-thistles (Ann. & Per.)	Spurge (Leafy)	Spurry (Corn)	Stinkweed	Stork's-bill	Thistle (Canada)	Thistle[4] (Russian)
Canola **(TTC - triazine tolerant canola)** **(RR - Roundup Ready Canola)** **(ST - SMART Canola)** **(Liberty Link Canola)**	Liberty Link Lontrel[1] (Per) Reglone[3] Roundup (RR)	Reglone[3]	Edge Freedom Gold Reglone[3] Roundup (RR) Sencor (TTC)	Bladex (TTC) Freedom Gold Liberty Link Muster Muster Gold Odyssey (ST) Pursuit Reglone[3] Roundup (RR) Sencor (TTC)	Liberty Link Odyssey (ST) Reglone[3] Roundup (RR)	Liberty Link[1] Lontrel Reglone[3] Roundup (RR)	Bonanza Edge[1] Liberty Link Rival Odyssey (ST) Roundup (RR) Sencor (TTC)
Flax	Buctril M[1] (Per) Lontrel[1] (Per) MCPA[1] MCPA K-salt (Ann) Poast Flaxmax (Ann) (Per)[1] Reglone[3]	MCPA[1] Reglone[3]	Basagran Eptam MCPA K-salt Reglone[3]	Basagran Buctril M Hoe-Grass II MCPA Poast Flaxmax[5] Reglone[3] Stampede EDF	Basagran Reglone[3]	Basagran[1] Buctril M[1] Lontrel MCPA[1] Poast Flaxmax Reglone[3]	Basagran Bonanza Buctril M 2,4-D[1] Hoe-Grass II MCPA Rival
Mustard	Reglone[3]	Reglone[3]	Edge Reglone[3]	Reglone[3]	Reglone[3]	Reglone[3]	Bonanza Edge[1] Rival
Sunflowers	Reglone[3]		Edge Eptam Reglone[3]	Assert Reglone[3]		Reglone[3]	Bonanza Edge[1] Rival

[1] Suppression only

[2] Pre-crop emergence to weed seedlings

[3] Used as a crop desiccant

[4] See page 42 for resistance information

HERBICIDE SELECTOR CHART – FORAGE LEGUMES

Crop	Crop Stage	Barley (Foxtail)	Bindweed (Field)		Bluebur	Buckwheat (Wild)		Catchfly (Night-flowering)
Alfalfa	SEEDLING		Basagran[1,5] Caliber 400[1] Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5]	Roundup (spot)[5] SEE 2,4-DB[1] Vantage; Credit Victor (spot)[5]	Pardner[5]	Advance 10G Bonanza 10G Caliber 400 Cobutox 600 Edge[5]	Embutox 625 Pardner[5] SEE 2,4-DB Treflan	
	ESTABLISHED	Kerb[4] Reglone[1,3]	Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5]	Vantage; Credit Victor (spot)5	Pardner5 Reglone[3]	Pardner[5] Princep[4]	Reglone[3] Simazine 80W[4]	Pardner[5] Reglone[3]
Alsike Clover	SEEDLING		Basagran[1,5] Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5]	Roundup (spot)[5] SEE 2,4-DB[1] Tropotox Plus[1] Vantage; Credit Victor (spot)[5]		Bonanza 400 Caliber 400 Cobutox 600	Embutox 625 SEE 2,4-DB Treflan	
	ESTABLISHED		Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]				
Red Clover	SEEDLING		Basagran[1,5] Clovitox Glyfos (spot)[5] Roundup (spot)[5]	Tropotox Plus[1] Vantage; Credit Victor (spot)[5]		Bonanza 400 Treflan		
	ESTABLISHED	Reglone[1,3]	Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5]	Vantage; Credit Victor (spot)5	Reglone[3]	Reglone[3]		Reglone[3]
White Dutch Clover	SEEDLING		Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5]	Roundup (spot)[5] Tropotox Plus[1] SEE 2,4-DB[1] Vantage; Credit Victor (spot)[5]		Caliber 400 Cobutox 600	Embutox 625 SEE 2,4-DB	
	ESTABLISHED	Reglone[1,3]	Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5]	Vantage; Credit Victor (spot)5	Reglone[3]	Reglone[3]		Reglone[3]
Sweet Clover	SEEDLING		Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]		Bonanza 400 Rival Treflan		
	ESTABLISHED		Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]				
Bird's-Foot Trefoil	SEEDLING		Caliber 400[1] Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5]	Roundup (spot)[5] SEE 2,4-DB[1] Vantage; Credit Victor (spot)[5]		Bonanza 400 Caliber 400 Cobutox 600	Embutox 625 SEE 2,4-DB Treflan	
	ESTABLISHED	Kerb[4] Reglone[1,3]	Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]	Reglone[3]	Princep[4] Reglone[3] Simazine 80W[4]		Reglone[3]
Sainfoin	SEEDLING		Basagran[1,5] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5		Rival 500/DF Treflan		
	ESTABLISHED		Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]				

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE LEGUMES

Crop	Crop Stage	Chamomile (Scentless) (Seedlings)	Chickweed	Clovers	Dandelion	Flixweed (Seedlings)	Foxtail (Green)
Alfalfa	SEEDLING		Advance 10G Basagran[5] Edge[5] Eptam (ppi) Kerb[4] Treflan		Caliber 400[1] Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1]		Achieve[4] Advance 10G Edge[5] Eptam (ppi) Hoe-Grass 284[4] Poast Ultra[4] Pursuit[1,5] Select Treflan Venture DG[4]
	ESTABLISHED	Pardner[5] Reglone[1,3] Velpar[5]	Kerb[4] Reglone[3]	Princep[4] Reglone[1,3] Simazine 80W[4]	Reglone[1,3] Velpar[5]	Reglone[3] Sencor (irr)[4]	Assure II[5] Poast Ultra[4] Pursuit[1,5] Reglone[3] Venture DG[4]
Alsike Clover	SEEDLING		Basagran[5] Bonanza 400 Treflan		Caliber 400[1] Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1]		Achieve[4] Hoe-Grass 284[5] Poast Ultra[5] Treflan
	ESTABLISHED						Poast Ultra[5]
Red Clover	SEEDLING		Basagran[5] Bonanza 400 Treflan				Achieve[4] Hoe-Grass 284[4] Treflan Venture DG[4]
	ESTABLISHED	Reglone[1,3]	Reglone[3]	Reglone[1,3]	Reglone[1,3]	Reglone[3]	Reglone[3] Venture DG[4]
White Dutch Clover	SEEDLING				Caliber 400[1] Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1]		Achieve[4]
	ESTABLISHED	Reglone[1,3]	Reglone[3]	Reglone[1,3]	Reglone[1,3]	Reglone[3]	Reglone[3]
Sweet Clover	SEEDLING		Bonanza 400 Rival Treflan				Achieve[4] Hoe-Grass 284[4] Poast Ultra[5] Rival Treflan
	ESTABLISHED						Poast Ultra[5]
Bird's-Foot Trefoil	SEEDLING		Bonanza 400 Eptam (ppi) Kerb[4] Treflan		Caliber 400[1] Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1]		Achieve[4] Eptam (ppi) Treflan Venture DG[4]
	ESTABLISHED	Reglone[1,3]	Kerb[4] Reglone[3]	Princep[4] Reglone[1,3] Simazine 80W[4]	Reglone[1,3]	Reglone[3]	Reglone[3] Venture DG[4]
Sainfoin	SEEDLING		Basagran[5] Rival 500/DF Treflan				Achieve[4] Hoe-Grass 284[5] Poast Ultra[5] Rival 500/DF Treflan
	ESTABLISHED						Poast Ultra[5]

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
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[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE LEGUMES

Crop	Crop Stage	Grass (Barnyard)		Grass (Quack)		Groundsel (Common)	Hawk's-beard (Narrow-leaved)
Alfalfa	SEEDLING	Advance 10G Edge[5] Eptam (ppi) Hoe-Grass 284[4]	Poast Ultra[4] Select Treflan Venture DG[4]	Amitrol T (spot)[4] Eptam (ppi)[1] Kerb[4] Glyfos (spot)[5] Poast Ultra[1,4]	Roundup (spot)[5] Select Vantage; Credit Venture[1,4] Victor (spot)[5]	Basagran[5] Pardner[5]	Caliber 400 Embutox 625 SEE 2,4-DB Cobutox 600
	ESTABLISHED	Assure II[5] Poast Ultra[4] Princep[4]	Reglone[3] Simazine 80W[4] Venture DG[4]	Amitrol T (spot)[4] Assure II[5] Glyfos (spot)[5] Kerb[4] Poast Ultra[1,4] Reglone[1,3]	Roundup (spot)[5] Vantage; Credit Velpar[5] Venture[1,4] Victor (spot)[5]	Pardner[5] Reglone[3]	Reglone[1,3] Velpar[5]
Alsike Clover	SEEDLING	Bonanza 400 Hoe-Grass 284[5]	Poast Ultra[5] Treflan	Amitrol T (spot)[4] Glyfos (spot)[5] Poast Ultra[1,5]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]	Basagran[5]	Caliber 400 Embutox 625 SEE 2,4-DB Cobutox 600
	ESTABLISHED	Poast Ultra[5]		Amitrol (spot)[4] Glyfos (spot)[5] Poast Ultra[1,5]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]		
Red Clover	SEEDLING	Bonanza 400 Hoe-Grass 284[4]	Treflan Venture DG[4]	Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Venture[1,4] Victor (spot)[5]	Basagran[5]	
	ESTABLISHED	Reglone[3] Venture DG[4]		Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5]	Vantage; Credit Venture[1,4] Victor (spot)[5]	Reglone[3]	Reglone[1,3]
White Dutch Clover	SEEDLING			Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5		Caliber 400 Embutox 625 SEE 2,4-DB Cobutox 600
	ESTABLISHED	Reglone[3]		Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]	Reglone[3]	Reglone[1,3]
Sweet Clover	SEEDLING	Bonanza 400 Hoe-Grass 284[4] Poast Ultra[5]	Rival Treflan	Amitrol T (spot)[4] Glyfos (spot)[5] Poast Ultra[1,5]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]		
	ESTABLISHED	Poast Ultra[5]		Amitrol T (spot)[4] Glyfos (spot)[5] Poast Ultra[1,5]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]		
Bird's-Foot Trefoil	SEEDLING	Bonanza 400 Eptam (ppi)	Treflan Venture DG[4]	Kerb[4] Eptam (ppi)[1] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Venture1,4 Victor (spot)[5]		Caliber 400 Embutox 625 SEE 2,4-DB Cobutox 600
	ESTABLISHED	Princep[4] Reglone[3]	Simazine 80W[4] Venture DG[4]	Kerb[4] Glyfos (spot)[5] Reglone[3] Roundup (spot)[5]	Vantage; Credit Venture1,4 Victor (spot)[5]	Reglone[3]	Reglone[1,3]
Sainfoin	SEEDLING	Hoe-Grass 284[5] Poast Ultra[5]	Rival 500/DF Treflan	Glyfos (spot)[5] Poast Ultra[1,5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5	Basagran[5]	
	ESTABLISHED	Poast Ultra[5]		Glyfos (spot)[5] Poast Ultra[1,5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5		

[1] Suppression only
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[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE LEGUMES

Crop	Crop Stage	Kochia	Lamb's-quarters		Mustards	Oats (Wild)	
Alfalfa	SEEDLING	Edge[5] Pardner[5]	Advance 10G Basagran[5] Caliber 400 Cobutox 600 Edge[5]	Embutox 625 Eptam (ppi) Pardner[5] SEE 2,4-DB Treflan	Basagran[5] Caliber 400 Cobutox 600 Embutox 625 Pardner[5] Pursuit SEE 2,4-DB	Achieve[4] Advance 10G Avadex BW[4] Avenge[4] Edge[5] Eptam (ppi) Hoe-Grass 284[4]	Kerb[4] Mataven[5] Poast Ultra[4] Select Treflan Venture[4]
	ESTABLISHED	Pardner[5] Reglone[3] Sencor (irr)[4]	Pardner[5] Princep[4] Reglone[3]	Sencor (irr)[4] Simazine 80W[4]	Pardner[5] Pursuit[5] Reglone[3]	Assure II[5] Kerb[4] Poast Ultra[4] Princep[4]	Reglone[3] Sencor (irr)[4] Simazine 80W[4] Venture[4]
Alsike Clover	SEEDLING		Basagran[5] Bonanza 400 Caliber 400 Clovitox Cobutox 600	Embutox 625 SEE 2,4-DB Treflan Tropotox Plus	Basagran[5] Caliber 400 Cobutox 600 Embutox 625 SEE 2,4-DB Tropotox Plus	Achieve[4] Avadex BW[4] Hoe-Grass 284[5]	Poast Ultra[5] Treflan
	ESTABLISHED					Poast Ultra[5]	
Red Clover	SEEDLING		Basagran[5] Bonanza 400 Clovitox	Treflan Tropotox Plus	Basagran[5] Clovitox Tropotox Plus	Achieve[4] Avadex BW[4] Avenge[4] Hoe-Grass 284[4]	Mataven[5] Treflan Venture[4]
	ESTABLISHED	Reglone[3]	Reglone[3]		Reglone[3]	Reglone[3] Venture[4]	
White Dutch Clover	SEEDLING		Caliber 400 Clovitox Cobutox 600	Embutox 625 SEE 2,4-DB Tropotox Plus	Caliber 400 Clovitox Cobutox 600 Embutox 625 SEE 2,4-DB Tropotox Plus	Achieve[4] Avadex BW[4]	
	ESTABLISHED	Reglone[3]	Reglone[3]		Reglone[3]	Reglone[3]	
Sweet Clover	SEEDLING		Bonanza 400 Rival 500/DF Treflan			Achieve[4] Avadex BW[4] Avenge[4] Hoe-Grass 284[4]	Poast Ultra[5] Rival 500/DF Treflan
	ESTABLISHED					Poast Ultra[5]	
Bird's-Foot Trefoil	SEEDLING		Bonanza 400 Caliber 400 Cobutox 600 Embutox 625	Eptam (ppi) SEE 2,4-DB Treflan	Caliber 400 Cobutox 600 Embutox 625 SEE 2,4-DB	Achieve[4] Avadex BW[4] Avenge[4] Eptam (ppi)	Kerb[4] Mataven[5] Treflan Venture[4]
	ESTABLISHED	Reglone[3]	Princep[4] Reglone[3] Simazine 80W[4]		Reglone[3]	Kerb[4] Princep[4] Reglone[3]	Simazine 80W[4] Venture[4]
Sainfoin	SEEDLING		Basagran[5] Rival 500/DF Treflan		Basagran[5]	Achieve[4] Hoe-Grass 284[5] Mataven[5]	Poast Ultra[5] Rival 500/DF Treflan
						Poast Ultra[5]	

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[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE LEGUMES

Crop	Crop Stage	Pigweed (Redroot)	Shepherd's-purse (Seedlings)	Smartweeds	Sow-thistle (Perennial)
Alfalfa	SEEDLING	Advance 10G Basagran[1,5] Caliber 400 Cobutox 600 Edge[5] Embutox 625 Eptam (ppi) Pardner[5] Pursuit SEE 2,4-DB Treflan	Basagran[5] Caliber 400 Cobutox 600 Embutox 625 SEE 2,4-DB	Basagran[5] Caliber 400[1] Cobutox 600[1] Embutox 625[1] Pardner[5] Pursuit[5] SEE 2,4-DB[1]	Amitrol T (spot)[4] Caliber 400[1] Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5] Roundup SEE2,4-DB[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Pardner[5] Pursuit[5] Reglone[3] Sencor (irr)[4]	Reglone[3] Sencor (irr)[4]	Pardner[5] Princep[4] Reglone[3] Simazine 80W[4]	Amitrol T (spot)[4] Clovitox Glyfos (spot)[5] Reglone (spot)[5] Roundup (spot)[5] Tropotox Plus Vantage; Credit Velpar[5] Victor (spot)[5]
Alsike Clover	SEEDLING	Basagran[1,5] Bonanza 400 Caliber 400 Clovitox Cobutox 600 Embutox 625 SEE 2,4-DB Treflan Tropotox Plus	Basagran[1,5] Caliber 400 Clovitox Cobutox 600 Embutox 625 SEE 2,4-DB Tropotox Plus	Basagran[5] Caliber 400[1] Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1]	Amitrol T (spot)[4] Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5] Roundup SEE 2,4-DB[1] Tropotox Plus[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED				Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
Red Clover	SEEDLING	Basagran[1,5] Bonanza 400 Clovitox Treflan Tropotox Plus	Basagran[5] Clovitox Tropotox Plus	Basagran[5]	Amitrol T (spot)[4] Clovitox Glyfos (spot)[5] Roundup (spot)[5] Tropotox Plus[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Reglone[3]	Reglone[3]	Reglone[3]	Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
White Dutch Clover	SEEDLING	Caliber 400 Clovitox Cobutox 600 Embutox 625 SEE 2,4-DB Tropotox Plus	Caliber 400 Clovitox Cobutox 600 Embutox 625 SEE 2,4-DB Tropotox Plus	Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1]	Amitrol T (spot)[4] Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5] Roundup SEE 2,4-DB[1] Tropotox Plus[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Reglone[3]	Reglone[3]	Reglone[3]	Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
Sweet Clover	SEEDLING	Bonanza 400 Rival 500/DF Treflan			Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
	ESTABLISHED				Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
Bird's-Foot Trefoil	SEEDLING	Bonanza 400 Caliber 400 Cobutox 600 Embutox 625 Eptam (ppi) SEE 2,4-DB Treflan	Caliber 400 Cobutox 600 Embutox 625 SEE 2,4-DB	Caliber 400[1] Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1]	Caliber 400[1] Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5] Roundup SEE 2,4-DB[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Reglone[3]	Reglone[3]	Princep[4] Reglone[3] Simazine 80W[4]	Glyfos (spot)[5] Reglone[3] Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
Sanfoin	SEEDLING	Basagran[1,5] Rival 500/DF Treflan	Basagran[5]	Basagran[5]	Glyfos (spot)[5] Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
	ESTABLISHED				Glyfos (spot)[5] Roundup Vantage; Credit Victor (spot)[5]

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[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
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[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE LEGUMES

Crop	Crop Stage	Spurge (Leafy)	Spurry (Corn)	Stinkweed (Seedlings)	Thistle (Canada)	
Alfalfa	SEEDLING	Amitrol T (spot)[4]	Basagran[5] Edge[5] Eptam (ppi)	Basagran[5] Caliber 400 Cobutox 600 Embutox 625 Pardner[5] Pursuit SEE 2,4-DB	Amitrol T (spot)[4] Basagran[1,5] Caliber 400[1] Cobutox 600[1] Embutox 625[1]	Glyfos (spot)[5] Roundup (spot)[5] SEE 2,4-DB[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Amitrol T (spot)[4] Reglone[1,3]	Reglone[3]	Pardner[5] Pursuit[5] Reglone[3] Sencor (irr)[4]	Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
Alsike Clover	SEEDLING	Amitrol T (spot)[4]	Basagran[5]	Basagran[5] Caliber 400 Clovitox Cobutox 600 Embutox 625 SEE 2,4-DB Tropotox Plus	Amitrol T (spot)[4] Basagran[1,5] Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1]	Glyfos (spot)[5] Roundup (spot)[5] SEE 2,4-DB[1] Tropotox Plus[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Amitrol T (spot)[4]			Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]
Red Clover	SEEDLING	Amitrol T (spot)[4]	Basagran[5]	Basagran[5] Clovitox Tropotox Plus	Amitrol T (spot)[4] Basagran[1,5] Clovitox Glyfos (spot)[5]	Roundup (spot)[5] Tropotox Plus[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Amitrol T (spot)[4] Reglone[1,3]	Reglone[3]	Reglone[3]	Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
White Dutch Clover	SEEDLING	Amitrol T (spot)[4]		Caliber 400 Clovitox Cobutox 600 Embutox 625 SEE 2,4-DB Tropotox Plus	Amitrol T (spot)[4] Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5]	Roundup (spot)[5] SEE 2,4-DB[1] Tropotox Plus[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Amitrol T (spot)[4] Reglone[1,3]	Reglone[3]	Reglone[3]	Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
Sweet Clover	SEEDLING	Amitrol T (spot)[4]			Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
	ESTABLISHED	Amitrol T (spot)[4]			Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
Bird's-Foot Trefoil	SEEDLING	Amitrol T (spot)[4]	Eptam (ppi)	Caliber 400 Cobutox 600 Embutox 625 SEE 2,4-DB	Caliber 400[1] Cobutox 600[1] Embutox 625[1] Glyfos (spot)[5]	Roundup (spot)[5] SEE 2,4-DB[1] Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Amitrol T (spot)[4] Reglone[1,3]	Reglone[3]	Reglone[3]	Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
Sainfoin	SEEDLING	Amitrol T (spot)[4]	Basagran[5]	Basagran[5]	Basagran[1,5] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
	ESTABLISHED	Amitrol T (spot)[4]			Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]

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[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE LEGUMES

Crop	Crop Stage	Toadflax	
Alfalfa	SEEDLING	Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
Alsike Clover	SEEDLING	Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
Red Clover	SEEDLING	Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
	ESTABLISHED	Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
White Dutch Clover	SEEDLING	Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
	ESTABLISHED	Amitrol T (spot)[4] Glyfos (spot)[5] Reglone[1,3]	Roundup (spot)[5] Vantage; Credit Victor (spot)[5]
Sweet Clover	SEEDLING	Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
	ESTABLISHED	Amitrol T (spot)[4] Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
Bird's-Foot Trefoil	SEEDLING	Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Glyfos (spot)[5] Reglone[1,3] Roundup (spot)[5]	Vantage; Credit Victor (spot)5
Sainfoin	SEEDLING	Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]
	ESTABLISHED	Glyfos (spot)[5] Roundup (spot)[5]	Vantage; Credit Victor (spot)[5]

[1] Suppression only

[2] Pre-crop emergence to weed seedlings

[3] Used as a crop desiccant

[4] Grazing or feeding restrictions

[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE GRASSES

Crop	Crop Stage	Bindweed (Field)	Bluebur	Buckwheat (Wild)
Smooth Brome	SEEDLING	Basagran[1,5] 2,4-D[1] Glyfos Roundup (spot) Victor (spot) Target[1] Vantage; Credit	Buctril M[5] 2,4-D Pardner[5]	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D amine[1] Embutox 625 Hoe Grass II[5] Lontrel Pardner Target Triumph Plus
	ESTABLISHED	2,4-D[1] Glyfos MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)	2,4-D MCPA amine MCPA ester	2,4-D amine[1] Lontrel MCPA amine[1] MCPA ester[1]
Crested Wheatgrass	SEEDLING	Basagran[1,5] 2,4-D[1] Glyfos Roundup (spot) Target[1] Vantage; Credit Victor (spot)	Buctril M[5] 2,4-D Pardner[5]	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D amine[1] Embutox 625 Hoe Grass II[5] Lontrel Pardner[5] Target
	ESTABLISHED	2,4-D[1] Glyfos MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)	Ally 2,4-D MCPA amine MCPA ester	Ally 2,4-D amine[1] Lontrel MCPA amine[1] MCPA ester[1]
Intermediate Wheatgrass	SEEDLING	2,4-D[1] Glyfos Roundup (spot) Vantage; Credit Victor (spot)	Buctril M[5] 2,4-D Pardner[5]	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D amine[1] Embutox 625 Hoe Grass II[5] Lontrel Pardner[5] Target Triumph Plus
	ESTABLISHED	2,4-D[1] Glyfos MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)	Ally 2,4-D MCPA amine MCPA ester	Ally 2,4-D amine[1] Lontrel MCPA amine[1] MCPA ester[1]
Creeping Red Fescue	SEEDLING	Basagran[1,5] 2,4-D[1] Glyfos Roundup (spot) Target[1] Vantage; Credit Victor (spot)	Buctril M[5] 2,4-D Pardner[5]	Banvel/Banvel II + 2,4-D Buctril M [5] 2,4-D amine[1] Embutox 625 Hoe Grass II[5] Lontrel Pardner[5] Target Triumph Plus
	ESTABLISHED	2,4 -D[1] Banvel/Banvel II + 2,4-D[1] Glyfos MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)	Ally[1] 2,4-D MCPA amine MCPA ester	Ally[1] Banvel/Banvel II & Mixes 2,4-D amine[1] Lontrel MCPA amine[1] MCPA ester[1]
Russian Wild Rye	SEEDLING	2,4-D[1] Glyfos Roundup (spot) Vantage; Credit Victor (spot)	Buctril M[5] 2,4-D Pardner[5]	Buctril M[5] 2,4-D amine[1] Hoe Grass II[5] Lontrel Pardner[5]
	ESTABLISHED	2,4-D[1] Glyfos MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)	2,4-D MCPA amine MCPA ester	2,4-D amine[1] Lontrel MCPA amine[1] MCPA ester[1]
Timothy	SEEDLING	Basagran[1,5] 2,4-D[1] Glyfos Roundup (spot) Target[1] Vantage; Credit Victor (spot)	Buctril M[5] 2,4-D Pardner[5]	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D amine[1] Lontrel Pardner[5] Target
	ESTABLISHED	2,4-D[1] Glyfos MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)	2,4-D MCPA amine MCPA ester	2,4-D amine1 Lontrel MCPA amine[1] MCPA ester[1]
Hay and Grazing	WITH LEGUMES	Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1] Tropotox Plus[1]		Caliber 400 Cobutox 600 Embutox 625 SEE 2,4-DB
	NO LEGUMES	Banvel/Banvel II[1,4] Clovitox 2,4-D[1,4] MCPA amine[1,4] MCPA ester[1,4] MCPA Na-salt[1,4] Tropotox Plus[1] Tordon 22K[4]	2,4-D[4] MCPA amine[4] MCPA ester[4] MCPA Na-salt[4]	Banvel/Banvel II & Mixes 2,4-D[1] MCPA amine[1,4] MCPA ester[1,4] MCPA Na-salt[1,4]

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE GRASSES

Crop	Crop Stage	Catchfly (Night-flowering)	Chamomile (Scentless) (Seedlings)	Chickweed (Common)	Cleavers	Clovers	Cockle (Cow)
Smooth Brome	SEEDLING	Buctril M[5] Hoe Grass II[5] Pardner[5] Target	Buctril M[5] Hoe Grass II[5] Lontrel Pardner[5]	Basagran[5] Triumph Plus	Banvel/Banvel II & Mixes[1] Basagran Target	Lontrel	Banvel/Banvel II & Mixes Buctril M[5] Hoe Grass II[5] Pardner[5] Target Triumph Plus
	ESTABLISHED		Lontrel			Lontrel	
Crested Wheatgrass	SEEDLING	Buctril M[5] Hoe Grass II[5] Pardner[5] Target	Buctril M[5] Hoe Grass II[5] Lontrel Pardner[5]	Basagran[5]	Banvel/Banvel II & Mixes[1] Basagran Target	Lontrel	Banvel/Banvel II & Mixes Buctril M[5] Hoe Grass II[5] Pardner[5] Target
	ESTABLISHED		Ally Lontrel	Ally		Lontrel	Ally
Intermediate Wheatgrass	SEEDLING	Buctril M[5] Hoe Grass II[5] Pardner[5] Target	Buctril M[5] Hoe Grass II[5] Lontrel Pardner[5]	Triumph Plus	Banvel/Banvel II & Mixes[1] Target	Lontrel	Banvel/Banvel II & Mixes Buctril M[5] Hoe Grass II[5] Pardner[5] Target Triumph Plus
	ESTABLISHED		Ally Lontrel	Ally		Lontrel	Ally
Creeping Red Fescue	SEEDLING	Buctril M[5] Hoe Grass II[5] Pardner[5] Target	Buctril M[5] Hoe Grass II[5] Lontrel Pardner[5]	Basagran[5] Triumph Plus	Banvel/Banvel II + 2,4-D[1] Basagran Target	Banvel/Banvel II Lontrel	Banvel/Banvel II + 2,4-D Buctril M[5] Hoe Grass II[5] Pardner[5] Triumph Plus
	ESTABLISHED		Ally Lontrel	Ally	Banvel/Banvel II + 2,4-D1	Banvel/Banvel II Lontrel	Ally Banvel/Banvel II + 2,4-D
Russian Wild Rye	SEEDLING	Buctril M[5] Hoe Grass II[5] Pardner[5]	Buctril M[5] Hoe Grass II[5] Lontrel Pardner[5]			Lontrel	Buctril M[5] Hoe Grass II[5] Pardner[5]
	ESTABLISHED		Lontrel			Lontrel	
Timothy	SEEDLING	Buctril M[5] Pardner[5] Target	Buctril M[5] Lontrel Pardner[5]	Basagran[5]	Banvel/Banvel II & Mixes[1] Basagran Target	Lontrel (Alsike only)	Banvel/Banvel II & Mixes Buctril M[5] Pardner[5] Target
	ESTABLISHED	Buctril M[5]	Lontrel			Lontrel (Alsike only)	
Hay and Grazing	WITH LEGUMES			Kerb[4]			
	NO LEGUMES		Tordon 22K[4]	Kerb[4]	Banvel/Banvel II & Mixes[4]	Banvel/Banvel II & Mixes[4]	Banvel/Banvel II & Mixes[4]

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE GRASSES

Crop	Crop Stage	Dandelion	Flixweed (Seedlings)	Foxtail (Green)	Grass (Barnyard)	Grass (Quack)
Smooth Brome	SEEDLING	Caliber 400 2,4-D[1] Embutox 625[1] SEE 2,4-DB	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D Target Triumph Plus	Achieve[5] Hoe Grass 284[4] Hoe Grass II[5] Triumph Plus	Hoe Grass 284[4] Hoe Grass II[5]	Glyfos Roundup (spot) Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D[1] MCPA amine[1] MCPA ester[1]	2,4-D MCPA amine MCPA ester	Achieve[5]		Glyfos Roundup (spot) Vantage; Credit Victor (spot)
Crested Wheatgrass	SEEDLING	2,4-D[1] Embutox 625[1]	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D Target	Achieve[5] Hoe Grass 284[4] Hoe Grass II[5]	Hoe Grass 284[4] Hoe Grass II[5]	Glyfos Roundup (spot) Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D[1] MCPA amine[1] MCPA ester[1]	Ally 2,4-D MCPA amine MCPA ester	Achieve[5]		Glyfos Roundup (spot) Vantage; Credit Victor (spot)
Intermediate Wheatgrass	SEEDLING	Caliber 400[1] 2,4-D[1] Embutox 625[1] SEE 2,4-DB[1]	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D Target Triumph Plus	Achieve[5] Hoe Grass 284[4] Hoe Grass II[5] Triumph Plus	Achieve[5] Hoe Grass 284[4] Hoe Grass II[5]	Glyfos Roundup (spot) Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D[1] MCPA amine[1] MCPA ester[1]	Ally 2,4-D MCPA amine MCPA ester	Achieve[5]		Glyfos Roundup (spot) Vantage; Credit Victor (spot)
Creeping Red Fescue	SEEDLING	Banvel/Banvel II + 2,4-D[1] 2,4-D[1] Embutox 625[1]	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D Target Triumph Plus	Achieve[5] Hoe Grass 284[4] Hoe Grass II[5] Poast Ultra[5] Triumph Plus Venture[5]	Hoe Grass 284[4] Hoe Grass II[5] Poast Ultra[5] Venture[5]	Glyfos Poast Ultra[5] Roundup (spot) Venture[5] Vantage; Credit Victor (spot)
	ESTABLISHED	Banvel/Banvel II + 2,4-D[1] 2,4-D[1] MCPA amine[1] MCPA ester[1]	Ally 2,4-D[1] MCPA amine MCPA ester	Achieve[5] Assure II[5] Poast Ultra[5] Venture[5]	Poast Ultra[5] Venture [5]	Assure II[5] Glyfos Poast Ultra[5] Roundup (spot) Vantage; Credit Venture[5] Victor (spot)
Russian Wild Rye	SEEDLING	2,4-D[1]	Buctril M[5] 2,4-D	Hoe Grass 284[4] Hoe Grass II[5]	Hoe Grass 284[4] Hoe Grass II[5]	Glyfos Roundup (spot) Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D[1] MCPA amine[1] MCPA ester[1]	2,4-D MCPA amine MCPA ester			Glyfos Roundup (spot) Victor (spot)
Timothy	SEEDLING	Caliber 400 2,4-D[1] Embutox 625[1] SEE 2,4-DB	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D Target			Glyfos Roundup (spot) Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D[1] MCPA amine[1] MCPA ester[1]	2,4-D MCPA amine MCPA ester	Achieve		Glyfos Roundup (spot) Vantage; Credit Victor (spot)
Hay and Grazing	WITH LEGUMES	Caliber 400[1] Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1]				Amitrol T (spot)[4] Kerb[4] Victor (spot)
	NO LEGUMES	2,4-D[1,4] MCPA amine[1,4] MCPA ester[1,4]	2,4-D[4] MCPA amine[4] MCPA ester[4]			Amitrol T (spot)[4] Kerb[4] Victor (spot)

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE GRASSES

Crop	Crop Stage	Groundsel (Common)	Hawk's-beard (Narrow-leaved)	Hemp-nettle	Kochia		Lamb's-quarters	
Smooth Brome	SEEDLING	Basagran[5] Buctril M[5] Hoe Grass II[5] Pardner[5]	2,4-D[1]	Target Triumph Plus	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5] Target Triumph Plus	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus
	ESTABLISHED		2,4-D[1]	MCPA amine[1] MCPA ester[1]	2,4-D MCPA amine MCPA ester		2,4-D MCPA amine MCPA ester	
Crested Wheatgrass	SEEDLING	Basagran[5] Buctril M[5] Hoe Grass II[5] Pardner[5]	2,4-D[1]	Target	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5] Target	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target
	ESTABLISHED	Ally	2,4-D[1]	Ally MCPA amine[1] MCPA ester[1]	Ally 2,4-D	MCPA amine MCPA ester	Ally 2,4-D	MCPA amine MCPA ester
Intermediate Wheatgrass	SEEDLING	Buctril M[5] Hoe Grass II[5] Pardner[5]	2,4-D[1]	Target Triumph Plus	Banvel/Banvel II & Mixes Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5] Target Triumph Plus	Banvel/Banvel II & Mixes Buctril M[5] Caliber 400 2,4-D Embutox 625	Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus
	ESTABLISHED	Ally	2,4-D[1]	Ally MCPA amine[1] MCPA ester[1]	Ally 2,4-D	MCPA amine MCPA ester	Ally 2,4-D	MCPA amine MCPA ester
Creeping Red Fescue	SEEDLING	Basagran[5] Buctril M[5] Hoe Grass II[5] Pardner[5]	2,4-D[1]	Target Triumph Plus	Banvel/Banvel II + 2,4-D Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5] Target Triumph Plus	Banvel/Banvel II + 2,4-D Basagran[5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus
	ESTABLISHED	Ally	2,4-D[1]	Ally MCPA amine[1] MCPA ester[1]	Ally Banvel/Banvel II + 2,4-D	2,4-D MCPA amine MCPA ester	Ally[1] Banvel/Banvel II + 2,4-D	2,4-D MCPA amine MCPA ester
Russian Wild Rye	SEEDLING	Buctril M[5] Hoe Grass II[5] Pardner[5]	2,4-D[1]		Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5]	Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5]
	ESTABLISHED		2,4-D[1]	MCPA amine[1] MCPA ester[1]	2,4-D MCPA amine MCPA ester		2,4-D MCPA amine MCPA ester	
Timothy	SEEDLING	Basagran[5] Buctril M[5] Pardner[5]	2,4-D[1]	Target	Banvel/Banvel II & Mixes Buctril M[5]	2,4-D Pardner[5] Target	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400	2,4-D Embutox 625 Pardner[5] SEE 2,4-DB Target
	ESTABLISHED		2,4-D[1]	MCPA amine[1] MCPA ester[1]	2,4-D MCPA amine MCPA ester		2,4-D MCPA amine MCPA ester	
Hay and Grazing	WITH LEGUMES		Caliber 400 Cobutox 600 Embutox 625 (Fall spraying) SEE 2,4-DB	Clovitox Tropotox Plus[1]			Caliber 400 Clovitox Cobutox 600	Embutox 625 SEE 2,4-DB Tropotox Plus
	NO LEGUMES		2,4-D[1] (Fall spraying)	Clovitox MCPA amine[1] MCPA ester[1] MCPA Na-salt[1] Tropotox Plus[1]	2,4-D[4] MCPA amine[4] MCPA ester[4]		Clovitox 2,4-D[4] MCPA amine[4]	MCPA ester[4] MCPA Na-salt[4] Tropotox Plus

[1] Suppression only
[4] Grazing or feeding restrictions
[2] Pre-crop emergence to weed seedlings
[5] Seed production only
[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – FORAGE GRASSES

Crop	Crop Stage	Mustards		Oats (Wild)	Pigweed (Redroot)		Shepherd's-purse (Seedlings)	
Smooth Brome	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus	Achieve[5] Avenge Hoe-Grass 284[4] Hoe Grass II[5] Mataven L Triumph Plus	Banvel/Banvel II & Mixes Basagran[1,5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400	2,4-D Embutox 625 SEE 2,4-DB Target Triumph Plus
	ESTABLISHED	2,4-D MCPA amine MCPA ester		Achieve[5]	2,4-D MCPA amine MCPA ester[1]		2,4-D MCPA amine MCPA ester	
Crested Wheatgrass	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target	Achieve[5] Avenge Hoe-Grass 284[4] Hoe Grass II[5] Mataven L	Banvel/Banvel II & Mixes Basagran[1,5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400	2,4-D Embutox 625 SEE 2,4-DB Target
	ESTABLISHED	Ally 2,4-D	MCPA amine MCPA ester	Achieve[5]	Ally 2,4-D	MCPA amine MCPA ester[1]	Ally[1] 2,4-D	MCPA amine MCPA ester
Intermediate Wheatgrass	SEEDLING	Banvel/Banvel II & Mixes Buctril M[5] Caliber 400 2,4-D Embutox 625	Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus	Achieve[5] Hoe-Grass 284[4] Hoe Grass II[5] Mataven L Triumph Plus	Banvel/Banvel II & Mixes Buctril M[5] Caliber 400 2,4-D Embutox 625	Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus	Banvel/Banvel II & Mixes Buctril M[5] Caliber 400 2,4-D	Embutox 625 SEE 2,4-DB Target Triumph Plus
	ESTABLISHED	Ally 2,4-D	MCPA amine MCPA ester	Achieve[5]	Ally 2,4-D	MCPA amine MCPA ester[1]	Ally[1] 2,4-D	MCPA amine MCPA ester
Creeping Red Fescue	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus	Achieve[5] Avenge Hoe-Grass 284[4] Hoe Grass II[5] Mataven L Poast Ultra[5] Triumph Plus Venture[5]	Banvel/Banvel II & Mixes Basagran[1,5] Buctril M[5] Caliber 400 2,4-D	Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Triumph Plus	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400	2,4-D Embutox 625 SEE 2,4-DB Triumph Plus
	ESTABLISHED	Ally Banvel/Banvel II + 2,4-D	2,4-D MCPA amine MCPA ester	Achieve[5] Assure II[5] Poast Ultra[5] Venture[5]	Ally Banvel/Banvel II + 2,4-D	2,4-D MCPA amine MCPA ester[1]	Ally Banvel/Banvel II + 2,4-D	2,4-D MCPA amine MCPA ester
Russian Wild Rye	SEEDLING	Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5]	Avenge Hoe-Grass 284[4] Hoe Grass II[5] Mataven L	Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5]	Buctril M[5] 2,4-D	
	ESTABLISHED	Ally[5] 2,4-D	MCPA amine MCPA ester		2,4-D MCPA amine MCPA ester[1]		2,4-D MCPA amine MCPA ester	
Timothy	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400	2,4-D Embutox 625 Pardner[5] SEE 2,4-DB Target	Avenge	Banvel/Banvel II & Mixes Basagran[1,5] Buctril M[5] Caliber 400	2,4-D Embutox 625 Pardner[5] SEE 2,4-DB Target	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400	2,4-D Embutox 625 SEE 2,4-DB Target
	ESTABLISHED	2,4-D MCPA amine MCPA ester		Achieve	2,4-D MCPA amine MCPA ester[1]		2,4-D MCPA amine MCPA ester	
Hay and Grazing	WITH LEGUMES	Caliber 400 Clovitox Cobutox 600	Embutox 625 SEE 2,4-DB Tropotox Plus	Kerb[4]	Caliber 400 Clovitox Cobutox 600	Embutox 625 SEE 2,4-DB Tropotox Plus	Caliber 400 Clovitox Cobutox 600	Embutox 625 SEE 2,4-DB Tropotox Plus
	NO LEGUMES	Banvel/Banvel II & Mixes Clovitox 2,4-D[4]	MCPA amine[4] MCPA ester[4] MCPA Na-salt[4] Tropotox Plus	Kerb[4]	Banvel/Banvel II & Mixes Clovitox 2,4-D[4]	MCPA amine[4] MCPA ester[4] MCPA Na-salt[4] Tropotox Plus	Banvel/Banvel II & Mixes Clovitox 2,4-D[4]	MCPA amine[4] MCPA ester[4] MCPA Na-salt[4] Tropotox Plus

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE GRASSES

Crop	Crop Stage	Smartweeds (Annual)		Sow-thistle (Perennial)			Spurge (Leafy)	Spurry (Corn)
Smooth Brome	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400[1] 2,4-D	Embutox 625[1] Hoe Grass II[5] Pardner[5] SEE 2,4-DB[1] Target Triumph Plus	Banvel/Banvel II & Mixes Buctril M[1,5] Caliber 400[1] 2,4-D[1]	Embutox 625[1] Glyfos Lontrel[1] Roundup (spot)	SEE 2,4-DB[1] Target[1] Vantage; Credit Victor (spot)	2,4-D[1]	Banvel/Banvel II & Mixes Basagran[5] Target Triumph Plus
	ESTABLISHED	2,4-D MCPA amine[1] MCPA ester[1]		2,4-D[1] Glyfos Lontrel[1]	MCPA amine[1] MCPA ester[1] Roundup (spot)	Vantage; Credit Victor (spot)	2,4-D[1] MCPA amine[1] MCPA ester[1]	
Crested Wheatgrass	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400[1] 2,4-D	Embutox 625[1] Hoe Grass II[5] Pardner[5] SEE 2,4-DB[1] Target	Banvel/Banvel II & Mixes Buctril M[1,5] Caliber 400[1] 2,4-D[1]	Embutox 625[1] Glyfos Lontrel[1] Roundup (spot)	SEE 2,4-DB[1] Target[1] Vantage; Credit Victor (spot)	2,4-D[1]	Banvel/Banvel II & Mixes Basagran[5] Target
	ESTABLISHED	Ally[1] 2,4-D	MCPA amine[1] MCPA ester[1]	Ally[1] 2,4-D[1] Glyfos	Lontrel[1] MCPA amine[1] MCPA ester[1]	Roundup (spot) Vantage; Credit Victor (spot)	2,4-D[1] MCPA amine[1] MCPA ester[1]	Ally[1]
Intermediate Wheatgrass	SEEDLING	Banvel/Banvel II & Mixes Buctril M[5] Caliber 400[1] 2,4-D Embutox 625[1]	Hoe Grass II[5] Pardner[5] SEE 2,4-DB[1] Target Triumph Plus	Banvel/Banvel II & Mixes Buctril M[1,5] Caliber 400[1]	2,4-D[1] Embutox 625[1] Glyfos Lontrel[1]	Roundup (spot) SEE 2,4-DB[1] Target[1] Victor (spot)	2,4-D[1]	Banvel/Banvel II & Mixes Target Triumph Plus
	ESTABLISHED	Ally[1] 2,4-D	MCPA amine[1] MCPA ester[1]	Ally[1] 2,4-D[1] Glyfos	Lontrel[1] MCPA amine[1] MCPA ester[1]	Roundup (spot) Vantage; Credit Victor (spot)	2,4-D[1] MCPA amine[1] MCPA ester[1]	Ally[1]
Creeping Red Fescue	SEEDLING	Banvel/Banvel II + 2,4-D Basagran[5] Buctril M[5] Caliber 400[1] 2,4-D	Embutox 625[1] Hoe Grass II[5] Pardner[5] SEE 2,4-DB[1] Target Triumph Plus	Banvel/Banvel II + 2,4-D[1] Buctril M[1,5] Caliber 400[1] 2,4-D[1]	Embutox 625[1] Glyfos Lontrel[1] Roundup (spot)	SEE 2,4-DB[1] Target[1] Vantage; Credit Victor (spot)	2,4-D[1]	Banvel/Banvel II + 2,4-D Basagran[5] Target Triumph Plus
	ESTABLISHED	Ally Banvel/Banvel II + 2,4-D	2,4-D MCPA amine[1] MCPA ester[1]	Ally Banvel/Banvel II + 2,4-D[1] 2,4-D[1]	Glyfos Lontrel[1] MCPA amine[1]	MCPA ester[1] Roundup (spot) Victor (spot)	2,4-D[1] MCPA amine[1] MCPA ester[1]	Ally Banvel/Banvel II + 2,4-D
Russian Wild Rye	SEEDLING	Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5]	Buctril M[1,5] 2,4-D[1] Glyfos	Lontrel[1] Roundup (spot)	Vantage; Credit Victor (spot)	2,4-D[1]	
	ESTABLISHED	2,4-D MCPA amine[1] MCPA ester[1]		2,4-D[1] Glyfos Lontrel[1]	MCPA[1] Roundup (spot)	Vantage; Credit Victor (spot)	2,4-D[1] MCPA amine[1] MCPA ester[1]	
Timothy	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400[1]	2,4-D Embutox 625[1] Pardner[5] SEE 2,4-DB[1] Target	Banvel/Banvel II & Mixes Buctril M[1,5] Caliber 400[1] 2,4-D[1]	Embutox 625[1] Glyfos Lontrel[1] Roundup (spot)	SEE 2,4-DB[1] Target[1] Vantage; Credit Victor (spot)	2,4-D[1]	Banvel/Banvel II & Mixes Basagran[5] Target
	ESTABLISHED	2,4-D MCPA amine[1] MCPA ester[1]		2,4-D[1] Glyfos Lontrel[1]	MCPA amine MCPA ester[1] Roundup (spot)	Vantage; Credit Victor (spot)	2,4-D[1] MCPA amine[1] MCPA ester[1]	
Hay and Grazing	WITH LEGUMES	Caliber 400[1] Cobutox 600[1]	Embutox 625[1] SEE 2,4-DB[1]	Amitrol T (spot)[4] Caliber 400[1] Clovitox	Cobutox 600[1] Embutox 625[1]	SEE 2,4-DB[1] Tropotox Plus[1]	Amitrol T (spot)[4]	
	NO LEGUMES	Banvel/Banvel II & Mixes[4] 2,4-D[4]	MCPA amine[1,4] MCPA ester[1,4] MCPA Na-salt[4]	Amitrol T (spot) Banvel/Banvel II & Mixes[1,4] Clovitox	2,4-D[1,4] MCPA amine[1,4] MCPA ester[1,4]	MCPA Na- salt[1,4] Tropotox Plus[1] Tordon 22K[4]	Amitrol T (spot)[4] 2,4-D[1,4] MCPA amine[1,4] MCPA ester1,4 MCPA Na-salt[1,4] Tordon 22K[4]	Banvel/Banvel II & Mixes[4]

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE GRASSES

Crop	Crop Stage	Stinkweed (Seedlings)	Thistle (Canada)
Smooth Brome	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400 2,4-D Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus	Banvel/Banvel II & Mixes Basagran[1,5] Buctril M[1,5] Caliber 400[1] 2,4-D[1] Embutox 625[1] Glyfos Lontrel Roundup (spot) SEE 2,4-DB[1] Target[1] Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D MCPA amine MCPA ester	2,4-D[1] Glyfos Lontrel MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)
Crested Wheatgrass	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400 2,4-D Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target	Banvel/Banvel II & Mixes Basagran[1,5] Buctril M[1,5] Caliber 400[1] 2,4-D[1] Embutox 625[1] Glyfos Lontrel Roundup (spot) SEE 2,4-DB[1] Target[1] Vantage; Credit Victor (spot)
	ESTABLISHED	Ally[1] 2,4-D MCPA amine MCPA ester	Ally[1] 2,4-D[1] Glyfos Lontrel MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)
Intermediate Wheatgrass	SEEDLING	Banvel/Banvel II & Mixes Buctril M[5] Caliber 400 2,4-D Embutox 625 Hoe Grass II[5] Pardner[5] SEE 2,4-DB Target Triumph Plus	Banvel/Banvel II & Mixes Buctril M[1,5] Caliber 400[1] 2,4-D[1] Embutox 625[1] Glyfos Lontrel Roundup (spot) SEE 2,4-DB[1] Target[1] Triumph Plus[1] Vantage; Credit Victor (spot)
	ESTABLISHED	Ally[1] 2,4-D MCPA amine MCPA ester	Ally[1] 2,4-D[1] Glyfos Lontrel MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)
Creeping Red Fescue	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Hoe Grass II[5] 2,4-D Pardner[5] Target Triumph Plus	Banvel/Banvel II & Mixes[1] Basagran[1,5] Buctril M[1,5] Caliber 400[1] 2,4-D[1] Embutox 625[1] Glyfos Lontrel Roundup (spot) SEE 2,4-DB[1] Target[1] Triumph Plus[1] Vantage; Credit Victor (spot)
	ESTABLISHED	Ally Banvel/Banvel II + 2,4-D 2,4-D MCPA amine MCPA ester	Ally[1] Banvel/Banvel II + 2,4-D 2,4-D[1] Glyfos Lontrel MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)
Russian Wild Rye	SEEDLING	Buctril M[5] 2,4-D Hoe Grass II[5] Pardner[5]	Buctril M[1,5] 2,4-D[1] Glyfos Lontrel Roundup (spot) Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D MCPA amine MCPA ester	2,4-D[1] Glyfos Lontrel MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)
Timothy	SEEDLING	Banvel/Banvel II & Mixes Basagran[5] Buctril M[5] Caliber 400 2,4-D Embutox 625 Pardner[5] SEE 2,4-DB Target	Banvel/Banvel II & Mixes Basagran[1,5] Buctril M[1,5] 2,4-D[1] Embutox 625[1] Glyfos Lontrel Roundup (spot) Target[1] Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D MCPA amine MCPA ester	2,4-D[1] Glyfos Lontrel MCPA amine[1] MCPA ester[1] Roundup (spot) Vantage; Credit Victor (spot)
Hay and Grazing	WITH LEGUMES	Cobutox 600 Caliber 400 Clovitox Embutox 625 SEE 2,4-DB Tropotox Plus	Amitrol T (spot) Caliber 400[1] Clovitox Cobutox 600[1] Embutox 625[1] SEE 2,4-DB[1] Tropotox Plus[1]
	NO LEGUMES	Banvel/Banvel II & Mixes Clovitox 2,4-D[4] MCPA amine[4] MCPA ester[4] MCPA Na-salt[4] Tropotox Plus	Amitrol T (spot)[4] Banvel/Banvel II & Mixes[1,4] Clovitox 2,4-D[1,4] MCPA amine[1,4] MCPA ester[1,4] MCPA Na-salt[1,4] Tropotox Plus[1] Tordon 22K[4]

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – FORAGE GRASSES

Crop	Crop Stage	Thistle (Russian)		Toadflax	
Smooth Brome	SEEDLING	Banvel/Banvel II + 2,4-D Basagran[5] Buctril M[5]	2,4-D Hoe Grass II[5] Pardner[5] Target	Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D		Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
Crested Wheatgrass	SEEDLING	Banvel/Banvel II + 2,4-D Basagran[5] Buctril M[5]	2,4-D Hoe Grass II[5] Pardner[5] Target	Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
	ESTABLISHED	Ally[1] 2,4-D		Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
Intermediate Wheatgrass	SEEDLING	Banvel/Banvel II + 2,4-D Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5] Target Triumph Plus	Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
	ESTABLISHED	Ally[1] 2,4-D		Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
Creeping Red Fescue	SEEDLING	Banvel/Banvel II + 2,4-D Basagran[5] Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5] Target Triumph Plus	Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
	ESTABLISHED	Ally[1] Banvel/Banvel II + 2,4-D 2,4-D		Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
Russian Wild Rye	SEEDLING	Buctril M[5] 2,4-D	Hoe Grass II[5] Pardner[5]	Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D		Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
Timothy	SEEDLING	Banvel/Banvel II + 2,4-D Basagran[5] Buctril M[5]	2,4-D Pardner[5] Target	Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
	ESTABLISHED	2,4-D		Glyfos Roundup (spot)	Vantage; Credit Victor (spot)
Hay and Grazing	WITH LEGUMES			Amitrol T (spot)[4] Glyfos	Roundup (spot) Vantage; Credit
	NO LEGUMES	Banvel/Banvel II + 2,4-D	2,4-D[4] Target	Amitrol T (spot)[4] Tordon 22K[4]	

[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] Grazing or feeding restrictions
[5] Seed production only

HERBICIDE SELECTOR CHART – OTHER CROPS

Crop	Buckwheat (Tartary)	Buckwheat (Wild)		Catchfly (Night-flowering)	Chickweed (Common)		Cleavers
Beans (Snap, Dry)	Gramoxone[2] Reglone[3]	Advance 10G Bonanza Edge Gramoxone[2]	Reglone[3] Rival 500/DF Treflan	Reglone[3]	Advance 10G Basagran Bonanza Edge Eptam	Gramoxone[2] Patoran Reglone[3] Rival 500/DF Treflan	Basagran
Canary Seed	Banvel/Banvel II Buctril M Pardner Target	Banvel/Banvel II Buctril M	Pardner Target	Buctril M Pardner Target			
Carrots (C) and Parsnips	Gramoxone[2]	Afolan F Bonanza (C) Gramoxone[2] (C) Linuron 480 L	Lorox (C) Rival (C) Treflan (C)	Gramoxone[2] (C)	Afolan F Bonanza (C) Lorox (C)	Linuron 480 L Rival 500/DF Treflan (C)	
Corn Check label to ensure chosen chemical or mix is registered for use on the crop. **Field Corn Only (FC)**	Banvel/Banvel II + 2,4-D (FC) Buctril M 2,4-D[1] Dyvel DS Gramoxone[2] MCPA amine (FC) MCPA K-salt[1] (FC) MCPA Na-salt[1] (FC) Lentagran + Atrazine Pardner	Afolan F Atrazine Banvel/Banvel II (FC) Bladex Buctril M Caliber 400 (FC) Cobutox 600 (FC) 2,4-D[1] Dyvel DS Embutox 625 (FC) Gramoxone[2]	Lentagran + Atrazine Lorox L (FC) MCPA amine[1] (FC) MCPA K-salt[1] (FC) MCPA Na-salt[1] (FC) Pardner Primextra Princep SEE 2,4-DB (FC) Simazine 80W Sutan^{+} + Mixes	Buctril M Gramoxone[1,2] Pardner	Afolan F Basagran Eradicane 8-E Gramoxone[1,2]	Laddok Lorox L (FC) Princep Simazine 80W	Banvel/ Banvel II (FC)[1] Basagran Odyssey
Fababeans	Lexone + Treflan	Advance 10G Bonanza Edge	Rival Treflan		Advance 10G Basagran Bonanza Edge Lexone + Treflan	Rival Sencor + Edge Sencor + Treflan Treflan	Basagran
Lentils	Reglone[3] Sencor	Advance 10G Bonanza Reglone[3]	Rival Treflan	Reglone[3] Sencor	Advance 10G Bonanza Reglone[3]	Rival Sencor Treflan	
Peas (Field and Processing) Check label to ensure chosen chemical or mix is registered for use on the crop.	Gramoxone[2] Lexone DF MCPA amine[1] MCPA Na-salt[1] Reglone[3] Sencor	Advance 10G Bonanza Edge Gramoxone[2] MCPA amine[1] MCPA Na-salt[1]	Odyssey[1] Pursuit Reglone[3] Rival Treflan	Gramoxone[1,2] Reglone[3] Sencor	Advance 10G Basagran Bonanza Edge Gramoxone[2] Lexone DF Odyssey	Pursuit Reglone[3] Rival Sencor Sencor + Edge Sencor + Treflan Treflan	Basagran Odyssey Pursuit
Potatoes	Gramoxone[2] Reglone[3] Sencor	Afolan F Gramoxone[2] Linuron 480 L	Lorox Reglone[3]	Gramoxone[2] Reglone[3] Sencor	Afolan F Eptam (Irish) Gramoxone[2] Linuron 480 L	Lorox Patoran Reglone[3] Sencor	
Rutabagas	Gramoxone[2]	Bonanza Gramoxone[2]	Rival Treflan	Gramoxone[2]	Bonanza Eptam Gramoxone[2]	Rival 500/DF Treflan	
Tame Buckwheat							

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[1] Suppression only

[2] Pre-emergence to crop, post-emergent to weeds

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OTHER CROPS

Crop	Cocklebur		Cockle (Cow)	Darnel (Persian)		Foxtail (Green)	
Beans (Snap, Dry)	Basagran Gramoxone[2] Reglone[3]		Advance 10G Bonanza Edge Gramoxone[2] Reglone[3] Rival 500/DF Treflan	Bonanza Gramoxone[2] Hoe-Grass 284 Poast Ultra	Reglone[3] Rival 500/DF Treflan	Advance 10G Bonanza Edge Eptam Gramoxone[2] Hoe-Grass 284	Patoran Poast Ultra Reglone Rival 500/DF Treflan
Canary Seed	Banvel/Banvel II + MCPA Buctril M	MCPA amine MCPA ester	Banvel/Banvel II Buctril M Pardner Target				
Carrots (C) and Parsnips	Gramoxone[2] (C)		Bonanza (C) Gramoxone[2] (C) Rival 500/DF (C) Treflan (C)	Bonanza (C) Gramoxone[2] (C) Hoe-Grass 284 (C)	Rival 500/DF (C) Treflan (C)	Afolan F Bonanza (C) Gramoxone[2] (C) Hoe-Grass 284 (C)	Linuron 480 L Lorox (C) Rival 500/DF (C) Treflan (C)
Corn Check label to ensure chosen chemical or mix is registered for use on the crop. **Field Corn Only (FC)**	Banvel/Banvel II + 2,4-D (FC) Basagran Buctril M Cobotox 600 (FC) 2,4-D Caliber 400 (FC) Dyvel DS	Embutox 625 (FC) Gramoxone[2] Laddok MCPA amine[1] (FC) MCPA K-salt[1] (FC) MCPA Na-salt[1](FC) SEE 2,4-DB (FC)	Banvel/Banvel II + 2,4-D (FC) BuctriL M Dyvel DS Gramoxone[2] (C) Pardner	Gramoxone[2] (C)		Accent (FC) Afolan F Atrazine Bladex Dual & Mixes Eradicane 8-E	Gramoxone[2] Lentagran + Atrazine Lorox L[1](FC) Primextra Sutan+
Fababeans	Basagran		Advance 10G Bonanza Edge Rival Treflan	Advance 10G Edge Hoe-Grass 284	Poast Ultra Rival Treflan	Advance 10G Bonanza Edge Hoe-Grass 284	Poast Ultra Rival Treflan
Lentils	Reglone[3]		Advance 10G Bonanza Reglone[3] Rival Treflan	Advance 10G Bonanza Fusion Hoe-Grass 284 Poast Ultra	Reglone[3] Rival Treflan Venture	Advance 10G Assure II Bonanza Fusion Hoe-Grass 284 Poast Ultra	Reglone[3] Rival Select Treflan Venture
Peas (Field and Processing) Check label to ensure chosen chemical or mix is registered for use on the crop.	Basagran Gramoxone[2] MCPA amine[1]	MCPA Na-salt[1] Reglone[3]	Advance 10G Bonanza Edge Gramoxone[2] Reglone[3] Rival Treflan	Advance 10G Fusion Gramoxone[2] Hoe-Grass 284 Odyssey	Poast Ultra Reglone[3] Rival Treflan Venture	Advance 10G Assure II Bonanza Edge Fusion Gramoxone[2] Hoe-Grass 284 NaTA (Field)	Odyssey Poast Ultra Pursuit Reglone[3] Rival Select Treflan Venture
Potatoes **Irrigated (irr)**	Gramoxone[2] Reglone[3]		Gramoxone[2] Reglone[3]	Gramoxone[2] Poast Ultra	Reglone[3] Select	Afolan F Dual & Mixes Eptam (Irish) Gramoxone[2] Hoe-Grass 284 Linuron 480 L	Lorox[1] Patoran Poast Ultra Prism (irr) Reglone[3] Select
Rutabagas	Gramoxone[2]		Bonanza Gramoxone[2] Rival 500/DF Treflan	Bonanza Gramoxone[2]	Rival 500/DF Treflan	Bonanza Eptam Gramoxone[2]	Rival 500/DF Treflan
Tame Buckwheat				Hoe-Grass 284 Poast Ultra		Hoe-Grass 284 Poast Ultra	

[1] Suppression only

[2] Pre-emergence to crop, post-emergent to weeds

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OTHER CROPS

Crop	Goosefoot	Grass (Barnyard)		Grass (Quack)	Groundsel (Common)	Hemp-nettle
Beans (Snap, Dry)	Gramoxone[2] Reglone[3]	Advance 10G Bonanza Edge Eptam Gramoxone[2] Hoe Grass 284	Patoran Poast Ultra Reglone[3] Rival 500/DF Treflan	Amitrol-T (white bean) Eptam Poast Ultra Reglone[3]	Basagran Gramoxone[2] Patoran Reglone[3]	Gramoxone[2] Reglone[3] Edge[1]
Canary Seed					Buctril M Pardner	Target
Carrots (C) and Parsnips	Afolan F Gramoxone[2] (C) Linuron 480 L Lorox (C)	Afolan F Gramoxone[2] (C) Hoe Grass 284 Linuron 480 L	Lorox (C) Rival 500/DF (C) Treflan	Gramoxone[2] (C)	Afolan F Gramoxone[2] (C) Linuron 480 L	Gramoxone[2] (C)
Corn Check label to ensure chosen chemical or mix is registered for use on the crop. **Field Corn Only (FC)**	Afolan F Bladex Caliber 400 (FC) Cobutox 600 (FC) 2,4-D amine Embutox 625 (FC) Gramoxone[2] Lorox (FC) MCPA amine[1] MCPA K-salt[1] (FC) MCPA Na-salt[1] (FC) SEE 2,4-DB (FC)	Accent (FC) Afolan F Atrazine Bladex Dual & Mixes Eradicane 8-E Gramoxone[2]	Lentagran + Atrazine Lorox L (FC) Primextra Princep Sutan+	Accent (FC) Amitrol-T Eradicane 8-E Gramoxone[2]	Afolan F Basagran Buctril M Gramoxone[2] Laddok Pardner	Gramoxone[2] MCPA amine[1] (FC) MCPA K-salt[1] (FC) MCPA Na-salt[1] (FC)
Fababeans		Advance 10G Bonanza Edge Hoe-Grass 284	Poast Ultra Reglone[3] Rival Treflan	Poast Ultra	Basagran Sencor + Treflan	Edge Lexone + Treflan Sencor + Edge Sencor + Treflan
Lentils	Reglone[3]	Advance 10G Assure II Bonanza Fusion Hoe-Grass 284	Poast Ultra Reglone[3] Rival Treflan Venture	Assure II Poast Ultra Reglone[3] Select	Reglone[3] Sencor	Harvest[3] Reglone[3] Sencor
Peas (Field and Processing) Check label to ensure chosen chemical or mix is registered for use on the crop.	Gramoxone[2] MCPA amine[1] MCPA Na-salt[1] Reglone[3]	Advance 10G Assure II Bonanza Edge Fusion Gramoxone[2] Hoe-Grass 284	Odyssey Poast Ultra Reglone[3] Rival Treflan Venture	Assure II NaTA (Field) Gramoxone[2] Poast Ultra Reglone[3] Select	Basagran Gramoxone[2] Reglone[3] Sencor	Edge[1] Gramoxone[2] Lexone DF MCPA amine[1] MCPA Na-salt[1] Odyssey[1] Pursuit Reglone[3] Sencor Sencor + Edge Sencor + Treflan Tropotox[1]
Potatoes **Irrigated (irr)**	Afolan F Gramoxone[2] Linuron 480 L Lorox Reglone[3]	Afolan F Dual & Mixes Eptam (Irish) Gramoxone[2] Hoe-Grass 284 Linuron 480 L	Lorox Patoran Poast Ultra Prism (irr) Reglone[3] Select	Eptam (Irish) Gramoxone[2] Poast Ultra Prism (irr) Reglone[3] Select	Afolan F Gramoxone[2] Linuron 480 L Patoran Reglone[3] Sencor	Gramoxone[2] Reglone[3] Sencor
Rutabagas	Gramoxone[2]	Bonanza Eptam Gramoxone[2]	Rival 500/DF Treflan	Eptam Gramoxone[2]	Gramoxone[2]	Gramoxone[2]
Tame Buckwheat		Hoe-Grass Poast Ultra		Poast Ultra		

[1] Suppression only

[2] Pre-emergence to crop, post-emergent to weeds

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OTHER CROPS

Crop	Knotweed	Kochia	Lamb's-quarters	Mustards
Beans (Snap, Dry)	Advance 10G Bonanza Gramoxone[2] Reglone[3] Rival 500/DF Treflan	Edge Gramoxone[2] Reglone[3]	Basagran Bonanza Edge Eptam Gramoxone[2] Patoran Reglone[3] Rival 500/DF Treflan	Basagran Gramoxone[2] Patoran Reglone[3]
Canary Seed	Target	Banvel/Banvel II + MCPA Buctril M Pardner Target	Banvel/Banvel II + MCPA Buctril M Pardner Target	Banvel/Banvel II + MCPA Buctril M Pardner Target
Carrots (C) and Parsnips	Afolan F Bonanza (C) Lorox (C) Gramoxone[2] (C) Linuron 480 Rival 500/DF (C) Treflan (C)	Afolan F Gramoxone[2] (C) Linuron 480	Afolan F Bonanza (C) Gramoxone[2] (C) Linuron 480 Lorox (C) Rival 500/DF (C) Treflan (C)	Afolan F Gramoxone[2] (C) Linuron 480 Lorox (C)
Corn Check label to ensure chosen chemical or mix is registered for use on the crop. **Field Corn Only (FC)**	Afolan F Bladex Dyvel DS Gramoxone[2] Linuron 480 Lorox L (FC)	Afolan F Banvel/Banvel II + 2,4-D (FC) Bladex Buctril M Dyvel DS 2,4-D Gramoxone[2] MCPA amine (FC) MCPA K-salt (FC) Pardner	Afolan F Atrazine Banvel/Banvel II + 2,4-D (FC) Basagran Bladex Buctril M Caliber 400 (FC) Clovitox Cobotox 600 (FC) Dyvel DS 2,4-D Embutox 625 (FC) Eradicane 8-E Gramoxone[2] Laddok Lentagran + Atrazine Linuron 480 (FC) Lorox L (FC) MCPA amine (FC) MCPA K-salt (FC) MCPA Na-salt (FC) Pardner Primextra Princep SEE 2,4-DB (FC) Sutan^{+} + Atrazine Sutan^{+} + Bladex Tropotox Plus (FC)	Afolan F Atrazine Banvel/Banvel II + 2,4-D (FC) Basagran Bladex Buctril M Caliber 400 (FC) Cobutox 600 (FC) Dyvel DS 2,4-D Embutox 625 (FC) Gramoxone[2] Laddok Lentagran + Atrazine Linuron 480 (FC) Lorox L (FC) MCPA amine (FC) MCPA K-salt (FC) MCPA Na-salt (FC) Pardner Primextra SEE 2,4-DB (FC) Sutan^{+} + Atrazine Sutan^{+} + Bladex
Fababeans	Advance 10G Bonanza Rival Treflan	Edge	Advance 10G Basagran Bonanza Edge Lexone + Treflan Rival Sencor + Edge Sencor + Treflan Treflan	Basagran Lexone + Treflan Sencor + Edge Sencor + Treflan
Lentils	Advance 10G Bonanza Reglone[3] Rival Treflan	Reglone[3]	Advance 10G Assure II Bonanza Reglone[3] Rival Sencor Treflan	Reglone[3] Sencor
Peas (Field and Processing) Check label to ensure chosen chemical or mix is registered for use on the crop.	Advance 10G Bonanza Gramoxone[2] Reglone[3] Rival Treflan	Edge Gramoxone[2] MCPA amine Odyssey Reglone[3]	Advance 10G Assure II Basagran Bonanza Clovitox Edge Gramoxone[2] Lexone DF (Field) MCPA amine MCPA Na-salt Odyssey[1] Pea Pack Reglone[3] Rival Sencor Sencor + Edge Sencor + Treflan Treflan Tropotox Plus	Basagran Clovitox Gramoxone[2] Lexone DF MCPA amine MCPA N-salt Odyssey Pea Pack Pursuit Reglone[3] Sencor Sencor + Edge Sencor + Treflan Tropotox Plus
Potatoes	Afolan F Gramoxone[2] Linuron 480 Lorox Reglone[3]	Afolan F Gramoxone[2] Linuron 480 Reglone[3]	Afolan F Eptam (Irish) Gramoxone[2] Linuron 480 Lorox Patoran Reglone[3] Sencor	Afolan F Gramoxone[2] Linuron 480 Lorox Patoran Reglone[3] Sencor
Rutabagas	Bonanza Gramoxone[2] Rival Treflan	Gramoxone[2]	Bonanza Eptam Gramoxone[2] Rival 500/DF Treflan	Gramoxone[2]
Tame Buckwheat				

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[1] Suppression only

[2] Pre-emergence to crop, post-emergent to weeds

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OTHER CROPS

Crop	Nightshade (American, Black, Hairy)		Oats (Wild, Vol.)		Pigweed (Prostrate)	
Beans (Snap, Dry)	Basagran (Hairy) Edge[1] (American, Black) Eptam (Hairy)	Gramoxone[2] Patoran (Black) Pursuit Reglone[3]	Bonanza Edge Eptam Hoe-Grass 284 Gramoxone[2]	Poast Ultra Reglone[3] Rival 500/DF Treflan	Advance 10G Bonanza Edge Eptam Gramoxone[2]	Patoran Reglone[3] Rival Treflan
Canary Seed	Buctril M (American)	Pardner (American, Black)	Avenge	Mataven L	Banvel/Banvel II + MCPA	Target
Carrots (C) and Parsnips	Gramoxone[2] (C)		Bonanza (C) Gramoxone[2] (C) Hoe-Grass 284 (C)	Rival 500/DF (C) Treflan (C)	Afolan F Bonanza (C) Gramoxone[2] (C) Linuron 480	Lorox Rival Treflan (C)
Corn Check label to ensure chosen chemical or mix is registered for use on the crop. **Field Corn Only (FC)**	Basagran (Hairy) Bladex (Black) Buctril M (American) Dual & Mixes Eradicane 8-E (Hairy) Gramoxone[2]	Laddok (Black) Lentagran + Atrazine Pardner (American, Black) Primextra (American)	Accent (FC) Atrazine Eradicane 8-E	Gramoxone[2] Princep Simazine 80W	Afolan F Banvel/Banvel II + 2,4-D (FC) Bladex Dyvel DS 2,4-D	Eradicane 8-E Linuron 480 Lorox Gramoxone[2] MCPA-K (FC) Primextra
Fababeans	Basagran (Hairy)	Edge[1] (American, Black)	Advance 10G Bonanza Edge Hoe-Grass 284	Poast Ultra Rival Treflan	Advance 10G Bonanza Edge	Rival Treflan
Lentils	Reglone[3]		Advance 10G Assure II Bonanza Fusion Hoe-Grass 284 Poast Ultra	Reglone[3] Rival Select Treflan Venture	Advance 10G Bonanza Reglone[3]	Rival Treflan
Peas (Field and Processing) Check label to ensure chosen chemical or mix is registered for use on the crop.	Basagran (Hairy) Edge[1] (American, Black)	Gramoxone[2] Reglone[3]	Advance 10G Assure II Avadex BW Bonanza Edge Fusion Gramoxone[2] Hoe-Grass 284	Odyssey Poast Ultra Pursuit Reglone[3] Rival Select Treflan Venture	Advance 10G Bonanza Edge Gramoxone[2]	Reglone[3] Rival Treflan
Potatoes	Dual & Mixes Eptam (Hairy) Gramoxone[2]	Patoran (Black) Reglone[3]	Eptam (Irish) Gramoxone[2] Hoe-Grass 284	Poast Ultra Reglone[3] Select	Afolan F Eptam (Irish) Gramoxone[2] Linuron 480	Lorox Patoran Reglone[3]
Rutabagas	Eptam (Hairy)	Gramoxone[2]	Bonanza Eptam Gramoxone[2]	Rival 500/DF Treflan	Eptam	Gramoxone[2]
Tame Buckwheat			Poast Ultra	Hoe-Grass 284		

[1] Suppression

[2] Pre-emergence to crop, post-emergent to weeds

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OTHER CROPS

Crop	Pigweed (Redroot)		Pigweed (Russian)	Purslane		Radish (Wild)	
Beans (Snap, Dry)	Advance 10G Basagran Bonanza Clovitox Edge Eptam	Gramoxone[2] Patoran Reglone[3] Rival 500/DF Treflan	Reglone[3]	Advance 10G Basagran[1] Bonanza Edge Eptam Excel Gramoxone[2]	Hoe-Grass 284 Patoran Poast Ultra Reglone[3] Rival 500/DF Treflan	Basagran Gramoxone[2] Reglone[3]	
Canary Grass	Banvel/Banvel II + MCPA Buctril M	Pardner Target				Banvel/Banvel II + MCPA	
Carrots (C) and Parsnips	Afolan F Bonanza (C) Gramoxone[2] (C) Linuron 480 (C)	Lorox (C) Rival (C) Treflan (C)	Gramoxone[2] (C)	Afolan F Bonanza (C) Gramoxone[2] (C) Linuron 480	Lorox (C) Rival 500/DF (C) Treflan	Afolan F Gramoxone[2] (C) Linuron 480	
Corn Check label to ensure chosen chemical or mix is registered for use on the crop. **Field Corn Only (FC)**	Afolan F Atrazine Banvel/Banvel II + 2,4-D (FC) Basagran[1] Bladex Buctril M Caliber 400 (FC) Clovitox Cobutox 600 (FC) Dyvel DS 2,4-D Embutox 625 (FC) Eradicane 8-E	Gramoxone[2] Laddok Lentagran + Atrazine Linuron 480 (FC) Lorox L (FC) MCPA amine (FC) MCPA K-salt MCPA Na-salt Pardner Primextra SEE 2,4-DB (FC) Sutan$^+$ + Atrazine Tropotox Plus (FC)	Banvel/Banvel II + 2,4-D (FC) 2,4-D Gramoxone[2] MCPA amine (FC) MCPA K-salts (FC) MCPA Na-salt (FC)	Afolan F Atrazine Basagran Bladex 2,4-D Eradicane 8-E Gramoxone[2] Laddok Lentagran + Atrazine Linuron 480 (FC)	Lorox L (FC) MCPA amine (FC) MCPA K-salt (FC) MCPA Na-salt (FC) Primextra Princep Simazine 80W Sutan$^+$ + Atrazine Sutan$^+$ + Bladex	Afolan F Banvel/Banvel II + 2,4-D (FC) Basagran[1] Caliber 400 (FC) Clovitox Cobutox 400 2,4-D Embutox 625 (FC)	Gramoxone[2] MCPA amine (FC) MCPA K-salt (FC) MCPA Na-salt (FC) SEE 2,4-DB (FC) Tropotox Plus (FC)
Fababeans	Advance 10G Basagran[1] Bonanza Edge Lexone + Treflan	Rival Sencor + Edge Sencor + Treflan Treflan		Advance 10G Basagran Bonanza	Edge Rival Treflan	Basagran	
Lentils	Advance 10G Reglone[3] Rival	Sencor Treflan	Reglone[3]	Advance 10G Bonanza Reglone[3]	Rival Treflan	Reglone[3]	
Peas (Field and Processing) Check label to ensure chosen chemical or mix is registered for use on the crop.	Advance 10G Basagran[1] Bonanza Clovitox Edge Gramoxone[2] Lexone DF (Field) MCPA amine MCPA Na-salt	Odyssey Pea Pack Pursuit Reglone[3] Rival Sencor Treflan Tropotox Plus	Gramoxone[2] MCPA amine MCPA Na-salt Reglone[3]	Advance 10G Basagran Edge Gramoxone[2] MCPA amine	MCPA Na-salt Reglone[3] Rival Treflan	Basagran Clovitox Gramoxone[2] MCPA amine	MCPA Na-salt Reglone[3] Tropotox Plus
Potatoes **Irrigated (irr)**	Afolan F Eptam (Irish) Gramoxone[2] Linuron 480 Lorox	Patoran Prism (irr) Reglone[3] Sencor	Reglone[3]	Afolan F Eptam (Irish) Gramoxone[2] Linuron 480	Lorox Patoran Reglone[3]	Afolan F Gramoxone[2] Reglone[3]	
Rutabagas	Bonanza Eptam Gramoxone[2]	Rival 500/DF Treflan	Gramoxone[2]	Bonanza Eptam Gramoxone[2]	Rival 500/DF Treflan	Gramoxone[2]	
Tame Buckwheat							

[1] Suppression only

[2] Pre-emergence to crop, post-emergent to weeds

[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OTHER CROPS

Crop	**Rapeseed (Volunteer)**	**Smartweeds (Annual)**		**Sow-thistles (Ann. & Per.)**		**Spurry (Corn)**	
Beans (Snap, Dry)	Gramoxone[2] Reglone[3]	Amiben Basagran Edge	Gramoxone[2] Patoran Reglone[3]	Gramoxone[2] Reglone[3]		Basagran Edge Eptam	Gramoxone[2] Patoran Reglone[3]
Canary Grass	Banvel/Banvel II + MCPA Buctril M Target	Banvel/Banvel II Buctril M	Pardner Target	Banvel/Banvel II[1] (Per) Buctril M[1] (Per)	MCPA[1] (All) Target (Ann) Target[1] (Per)	Banvel/Banvel II MCPA K-salt Target	
Carrots (C) and Parsnips	Gramoxone[2]	Afolan F Gramoxone[2] (C)	Linuron 480 Lorox (C)	Afolan F (Seedling) (Per) Gramoxone[2] (C)	Linuron 480 (C) (Seedling only) Lorox (C) (Ann)	Afolan F	Gramoxone[2] (C)
Corn Check label to ensure chosen chemical or mix is registered for use on the crop. **Field Corn Only (FC)**	Buctril M Clovitox Dyvel DS Gramoxone[2] Tropotox Plus (FC)	Afolan F Atrazine Banvel/Banvel II + 2,4-D (FC) Basagran Caliber 400 (FC) Clovitox Cobutox 600[1] (FC) 2,4-D Dyvel DS Embutox 625 (FC) Gramoxone[2] Laddok	Lentagran + Atrazine Linuron 480 (FC) Lorox L (FC) MCPA amine (FC) MCPA K-salt (FC) MCPA Na-salt (FC) Pardner Primextra SEE 2,4-DB (FC) Sutan^{+} + Atrazine Tropotox Plus (FC)	Afolan F (Seedling) (Per) Amitrol T (Spot) Banvel/Banvel II + 2,4-D (FC) (Per) Buctril M[1] (Per) Caliber 400[1] (FC) Clovitox Cobutox 600[1] (FC)	2,4-D[1] Dyvel DS Embutox 625[1] (FC) Gramoxone[2] Lorox L (Ann) MCPA[1] (FC) MCPA K-salt (FC) SEE 2,4-DB (FC) Tropotox Plus (FC)	Afolan F Banvel/Banvel II + 2,4-D (FC) Basagran Dyvel DS	Eradicane 8-E Gramoxone[2] Laddok MCPA K-salt
Fababeans	Lexone + Treflan Sencor + Edge Sencor + Treflan	Basagran Edge[1] Lexone + Treflan	Sencor + Edge Sencor + Treflan			Basagran Edge Sencor + Edge	Sencor + Treflan Lexone + Treflan
Lentils	Reglone[3] Sencor	Reglone[3] Sencor		Reglone[3]		Reglone[3] Sencor	
Peas (Field and Processing) Check labels to ensure chosen chemical or mix is registered for use on the crop.	Clovitox Gramoxone[2] Lexone DF (Field) Odyssey Pea Pack Pursuit Reglone[3] Sencor Sencor + Edge Sencor + Treflan Tropotox Plus	Basagran Clovitox Edge[1] Gramoxone[2] Lexone DF (Field) MCPA amine MCPA Na-salt	Odyssey Pursuit Reglone[3] Sencor Sencor + Edge Sencor + Treflan Tropotox Plus	Amitrol T (spot) Clovitox Gramoxone[2] MCPA amine[1]	MCPA Na-salt[1] Reglone[3] Tropotox Plus[1]	Basagran Edge Gramoxone[2] Reglone[3]	Sencor Sencor + Edge Sencor + Treflan
Potatoes	Gramoxone[2] Reglone[3] Sencor	Afolan F Gramoxone[2] Linuron 480	Lorox Patoran Reglone[3] Sencor	Afolan F (Seedling) (Per) Gramoxone[2]	Linuron 480 (Seedling only) Lorox L (Ann) Reglone[3]	Afolan F Eptam (Irish) Gramoxone[2]	Patoran Reglone[3] Sencor
Rutabagas	Gramoxone[2]	Gramoxone[2]		Gramoxone[2]		Eptam	Gramoxone[2]
Tame Buckwheat							

[1] Suppression only
[2] Pre-emergence to crop, post-emergent to weeds
[3] Used as a crop desiccant

HERBICIDE SELECTOR CHART – OTHER CROPS

Crop	Stinkweed		Thistle (Canada)		Thistle (Russian)		Volunteer Cereals
Beans (Snap, Dry)	Basagran Gramoxone[2]	Patoran Reglone[3]	Amitrol T (spot) Basagran[1]	Gramoxone[1,2] Reglone[3]	Basagran Gramoxone[2]	Reglone[3] Rival 500/DF	Edge Eptam Gramoxone[2] Poast Ultra Reglone[3]
Canary Grass	Banvel/Banvel II + MCPA Buctril M	Pardner Target	Banvel/Banvel II + MCPA[1]	Buctril M[1] Target	Buctril M Pardner Target		
Carrots (C) and Parsnips	Afolan F Gramoxone[2] (C)	Linuron 480 (C) Lorox (C)	Gramoxone[2] (C)[1]		Gramoxone[2] (C) Rival 500/DF (C)		Gramoxone[2] (C)
Corn Check label to ensure chosen chemical or mix is registered for use on the crop. **Field Corn Only (FC)**	Afolan F Banvel/Banvel II + 2,4-D (FC) Basagran Buctril M Caliber 400 (FC) Clovitox Cobutox 600[1] (FC) 2,4-D Dyvel DS	Embutox 625 (FC) Linuron 480 (FC) Lorox L (FC) MCPA amine (FC) MCPA K-salt (FC) MCPA Na-salt (FC) Pardner SEE Butyric 480 (FC) Tropotox Plus (FC)	Amitrol (spot) Banvel/Banvel II[1] + 2,4-D (FC) Basagran[1] Buctril M[1] Caliber 400[1] (FC) Clovitox Cobutox 600[1] (FC) 2,4-D[1]	Dyvel DS Embutox 625[1] (FC) Gramoxone[1,2] MCPA amine[1] (FC) MCPA K-salt[1] (FC) MCPA Na-salt[1] (FC) SEE 2,4-DB[1] (FC) Tropotox Plus[1] (FC)	Banvel/Banvel II + 2,4-D (FC) Basagran Bladex Buctril M	2,4-D Dyvel DS Gramoxone[2] Laddok Pardner	Eradicane 8-E Gramoxone[2]
Fababeans	Basagran Lexone + Treflan	Sencor + Edge Sencor + Treflan	Basagran[1]	Sencor + Treflan[2]	Advance 10G Basagran[1] Bonanza	Edge Rival Sencor + Treflan[1]	Edge Poast Ultra
Lentils	Reglone[3] Sencor		Reglone[3]	Sencor[1]	Advance 10G Bonanza Reglone[3]	Rival Sencor	Assure II Fusion Poast Ultra Select Reglone[3] Venture
Peas (Field and Processing) Check label to ensure chosen chemical or mix is registered for use on the crop.	Basagran Clovitox Gramoxone[2] Lexone DF (Field) MCPA amine MCPA Na-salt Odyssey	Pea Pack Pursuit Reglone[3] Sencor Sencor + Edge Sencor + Treflan Tropotox Plus	Amitrol T (spot) Basagran[1] Clovitox Gramoxone[1,2] MCPA amine[1]	MCPA Na-salt[1] Reglone[3] Sencor[1] Tropotox Plus[1]	Advance 10G Basagran Bonanza Edge[1]	Gramoxone[2] Reglone[3] Rival Sencor	Assure II Edge Fusion Gramoxone[2] Odyssey Poast Ultra Reglone[3] Select Venture
Potatoes	Afolan F Gramoxone[2] Linuron 480 Lorox	Patoran Reglone[3] Sencor	Gramoxone[2] Reglone[3]		Gramoxone[2] Reglone[3] Sencor		Eptam (Irish) Gramoxone[2] Poast Ultra Reglone[3] Select
Rutabagas	Gramoxone[2]		Gramoxone[2]		Bonanza Gramoxone[2]	Rival 500/DF Treflan	Eptam Gramoxone[2]
Tame Buckwheat							Poast Ultra

[1] Suppression only
[2] Pre-emergence to crop, post-emergent to weeds
[3] Used as a crop desiccant

INSECTICIDE SELECTOR CHART

Crop	BEETLES					STORED GRAIN INSECTS
	Blister	**Colorado Potato**	**Flea**	**Red Turnip**	**Sunflower Beetle**	**Flour Beetles, Grain Beetles, Mediterranean Flour Moth**
Barley, Oats, Wheat						Gastoxin Malathion Phostoxin
Rye						Gastoxin Malathion Phostoxin
Field Corn (FC) Sweet Corn (SC)			Dyfonate			Gastoxin (FC) Malathion (FC) Phostoxin
Alfalfa	Sevin					
Clover	Sevin		Sevin			
Pasture						
Canola			Benolin-R Counter Cymbush Decis Furadan Lindane Malathion Matador Ripcord Sevin See *Fungicide Section* for Seed Dressings	Furadan		
Flax						
Mustard			Counter Cymbush Decis Furadan Malathion Matador See *Fungicide Section* for Seed Dressings	Furadan		
Sunflower					Cymbush Decis Endosulfan Matador Thiodan Thionex	
Sugar Beets			Malathion			
Peas						
Potato		Ambush APM Birlane Cymbush Decis Dibrom Endosulfan 400 Furadan Guthion Lorsban Malathion Matador Monitor Orthene Pounce Ripcord Sevin Sniper Temik Thimet Thiodan Thionex	Ambush APM Cymbush Decis Dyfonate Endosulfan 400 Furadan Lannate Lorsban Matador Monitor Orthene Pounce Pyrinex Ripcord Sevin Sniper Thimet Thiodan Thionex			

NOTE:
Insecticides listed by trade name
[1] Insect suppression only

INSECTICIDE SELECTOR CHART

	BUTTERFLIES & MOTHS						
Crop	**Alfalfa Looper**	**Armyworms**	**Bertha Armyworm* or Clover Cutworm****	**Webworm**	**Cutworms (Army, Red-backed Pale Western)**	**Diamond-back Moth Larvae**	**European Corn Borer* or Corn Earworm****
Barley, Oats, Wheat		Dylox Guthion Lannate Lorsban Malathion Pyrinex Sevin Sniper			Ambush Decis Lorsban Pounce (Pale Western only) Pyrinex Ripcord (B,W)		
Rye		Dylox Guthion Lorsban Malathion Pyrinex Sevin			Ambush Pounce (Pale Western only)		
Field Corn (FC)		Dylox Lannate (FC) Sevin			Ambush Lorsban Pyrinex Ripcord		Ambush Cymbush Decis* (FC) Endosulfan 400 Furadan* Lannate (SC) Malathion (FC) Orthene Pounce (SC) Ripcord Sevin Thiodan** Thionex**
Sweet Corn (SC)		Ambush (fall armyworm)					
Alfalfa		Dylox Sevin		Dylox Sevin			
Clover		Sevin		Sevin			
Pasture							
Canola	Lannate Lorsban Pyrinex	Lorsban Pyrinex	Cymbush* Decis* Lannate Lorsban* Monitor* Pyrinex Ripcord*	Dylox Lannate	Ambush Lorsban Pyrinex	Decis Dylox Lorsban Malathion Pyrinex	
Flax		Dylox	Lannate* Decis** Dylox* Lorsban*	Decis Dylox	Ambush Decis Lorsban Pyrinex		
Mustard			Cymbush* Decis*		Lorsban Pyrinex	Decis Malathion	
Sunflower					Ambush Lorsban Pyrinex		
Sugar Beets		Dylox		Dylox Endosulfan Thiodan	Ambush Lorsban Pyrinex		
Peas	Lannate				Ambush		
Potato					Ambush Lorsban Pyrinex Ripcord		

NOTE:
Insecticides listed by trade name
[1] Insect suppression only

INSECTICIDE SELECTOR CHART

	BUTTERFLIES & MOTHS	FLIES		GRASSHOPPERS	PLANT BUGS	MITES
Crop	**Flax Bollworm**	**Root Maggots (Seed Corn, Sugar Beet)**	**Wheat Midge**	**(Clear winged, Migratory, Two-striped)**	**Alfalfa, Superb, Stink, Lygus, Tarnished**	**Two-spotted Brown Wheat Winter Grain**
Barley, Oats, Wheat			Cygon Lagon Lorsban Pyrinex	Cygon Decis Furadan Lorsban Malathion Matador Pyrinex Ripcord (B,W) Sevin		Lorsban Malathion Pyrinex
Rye				Guthion Malathion Sevin		
Field Corn (FC) **Sweet Corn (SC)**		See *Fungicide Section* for Seed Dressings Counter Dyfonate		Furadan Sevin		
Alfalfa				APM Cygon Furadan Guthion Lagon Malathion Sevin Sniper	APM Cygon Decis* Dylox Endosulfan Guthion Lagon Malathion Sniper Thiodan *Seed Production Only	Guthion Malathion
Clover				Cygon Furadan Guthion Malathion Sevin	Cygon Guthion Malathion Sniper	Malathion
Pasture				Cygon Decis Furadan Lagon Malathion Matador Sevin	Cygon Lagon	
Canola		Counter (Reduced feeding)		Cygon Furadan Lagon Lorsban Malathion Matador Monitor Pyrinex Ripcord Sevin	Dylox Lorsban	
Flax	Lannate			Decis Furadan Malathion		
Mustard		Counter (Reduced feeding)		Furadan Malathion Matador		
Sunflower						
Sugar Beets		Counter Furadan Temik				
Peas		See *Fungicide Section* for Seed Dressings				
Potato				Cygon Lagon	Ambush APM Cymbush Decis Endosulfan Furadan Guthion Lorsban Matador Orthene Pounce Pyrinex Ripcord Sniper Thiodan	

NOTE:
Insecticides listed by trade name
[1] Insect suppression only

INSECTICIDE SELECTOR CHART

	SUCKING INSECTS			THRIPS	WEEVILS	WIREWORMS
Crop	**Aphids (Corn Leaf, Green Bug, Green Peach, English Grain, Pea, Russian)**	**Leafhoppers (Potato)**	**Spittlebugs**	**Barley, Grass, Red Clover**	**Sunflower, Sweet Clover, Alfalfa**	
Barley, Oats, Wheat	Cygon Lagon Lorsban Malathion Pyrinex			Cygon Lagon Lannate Malathion		See *Fungicide Section* for Seed Dressings
Rye	Cygon Lagon Malathion					See *Fungicide Section* for Seed Dressings
Field Corn (FC) **Sweet Corn (SC)**	Endosulfan 400 Thiodan Thionex					Counter Dyfonate See *Fungicide Section* for Seed Dressings
Alfalfa	APM Cygon Endosulfan Guthion Lagon Malathion Sniper Thiodan Thionex	APM Cygon Guthion Malathion Sevin Sniper	APM Endosulfan 400 Guthion Malathion Sniper Thiodan Thionex		APM Cygon Decis* Furadan Guthion Lagon Malathion Sevin Sniper *Seed Production Only	
Clover	APM Cygon Lagon Sniper	APM Cygon Lagon Sniper	APM Endosulfan 400 Guthion Malathion Sniper Thiodan Thionex		Cygon Guthion Lagon Malathion Sevin Sniper	
Pasture	Cygon	Cygon Lagon				
Canola						
Flax						See *Fungicide Section* for Seed Dressings
Mustard						
Sunflower					Lorsban	
Sugar Beets	Endosulfan Thiodan Thionex					Counter
Peas	Cygon Endosulfan Lagon Lannate Thiodan Thionex				Endosulfan Thiodan Thionex	
Potato	APM Cygon Furadan Guthion Lannate Lagon Malathion Monitor Orthene Sniper Temik Thimet Thiodan Thionex	Ambush APM Cygon Cymbush Decis Endosulfa Furadan Guthion Lagon Lannate Malathion Matador Monitor Orthene Pounce Ripcord Sevin Sniper Temik Thimet Thiodan Thionex	APM Guthion Sniper			Dyfonate Thimet[1]

NOTE:
Insecticides listed by trade name
[1] Insect suppression only

FUNGICIDE SELECTOR CHART

Crop	Alternaria/ Black Spot	Blackleg	Bunt (Stinking Smut)	Crown Rust	Fusarium Head Blight	Leaf Rust
Barley						Tilt
Wheat			Baytan 30[2] D-B Green L Dithane M-22 Dividend Formalin N-M Drill Box N-M Dual Vitaflo 280 Vitavax Dual Powder Vitavax Dual Solution Vitavax Powder Vitavax Single Solution		Bravo 500[3]	Dithane DG Tilt
Oats				Tilt		
Rye			D-B Green L N-M Drill Box N-M Dual			
Brome Grass						
Canola	Foundation Premiere Plus Rovral Flo[3]	Benolin-R Cloak Foundation Premiere Plus Tilt Vitavax RS Flowable Vitavax RS Dynaseal				
Flax						
Mustard	Foundation Premiere Plus	Cloak Foundation Premiere Plus Vitavax rs Flowable Vitavax rs Dynaseal				

[1] Except Palliser

[2] Commercial seed treatment only

[3] Suppression only

FUNGICIDE SELECTOR CHART

Crop	Leaf Stripe	Net Blotch	Powdery Mildew	Scald	Sclerotinia
Barley	Baytan 30[2] Vitavax Dual Solution[3] Vitavax Single Solution[3]	Baytan 30[2,3] N-M Drill Box[1] Tilt Vitavax Dual Solution[3] Vitavax Single Solution[3]	Tilt	Baytan 30[2,3] Tilt	
Wheat			Baytan 30[2] Tilt		
Oats					
Rye					
Brome Grass					
Canola					Benlate Ronilan DF Rovral Flo
Flax					
Mustard					

[1] Except Palliser
[2] Commercial seed treatment only
[3] Suppression only

FUNGICIDE SELECTOR CHART

Crop	Root Rot	Seedling Blight (Pythium)	Seedling Blight (Rhizoctonia)	Seedling Blight Seed Rot Damping Off	Septoria
Barley	Baytan 30[2,3] D-B Green L[1] N-M Drill Box[1] N-M Dual[1] Vitavax Dual Solution[3] Vitavax Single Solution[3]			D-B Green L[1] N-M Drill Box[1] N-M Dual[1] Vitaflo 280 Vitavax Dual Powder Vitaflo Dual Purpose Vitavax Dual Vitavax Powder Vitavax Single Solution	Tilt
Wheat	D-B Green L Dividend N-M Drill Box N-M Dual Vitavax Dual Solution[3] Vitavax Single Solution[3]			D-B Green L N-M Drill Box N-M Dual Vitaflo 280 Vitaflo Dual Purpose Vitavax Dual Vitavax Single	Bravo 500 Dithane DG Dividend Tilt
Oats	D-B Green L N-M Drill Box N-M Dual Vitavax Dual Solution[3] Vitavax Single Solution[3]			D-B Green L N-M Drill Box N-M Dual Vitaflo 280 Vitaflo Dual Purpose Vitavax Dual Vitavax Single	Tilt
Rye	D-B Green L N-M Drill Box N-M Dual Vitavax Dual Solution[3] Vitavax Single Solution[3]			D-B Green L N-M Drill Box N-M Dual Vitaflo 280 Vitavax Dual Powder Vitavax Powder	
Brome Grass		Apron FL[2]			
Canola		Apron FL[2]	Foundation	Benolin-R Cloak Foundation Premiere Plus Rovral ST Vitavax rs Flowable Vitavax rs Dynaseal	
Flax	N-M Drill Box			N-M Drill Box Vitaflo 280 Vitavax Dual Powder Vitavax Powder Vitavax Single Solution	
Mustard			Foundation	Cloak Premiere Plus Thiram 75 WP Vitavax rs Flowable Vitavax rs Dynaseal	

[1] Except Palliser
[2] Commercial seed treatment only
[3] Suppression only

FUNGICIDE SELECTOR CHART

Crop	Smut (Covered, Loose)	Stem Rust	Stem Smut	Stripe Rust	Take All	Tan Spot
Barley	Baytan 30[2] D-B Green L[1] Formalin N-M Drill Box[1] N-M Dual[1] Vitaflo 280 Vitavax Dual Powder Vitavax Dual Solution Vitavax Powder Vitavax Single Solution	Tilt				
Wheat	Baytan 30[2] Dividend Formalin Vitavax Dual Powder Vitavax Dual Solution Vitavax Single Solution	Tilt		Tilt	Baytan 30[2,3] Dividend	Bravo 500 Dithane DG Tilt
Oats	D-B Green L Formalin N-M Drill Box N-M Dual Vitaflo 280 Vitavax Dual Powder Vitavax Dual Solution Vitavax Powder Vitavax Single Solution					
Rye			Vitaflo 280 Vitavax Dual Powder Vitavax Dual Solution Vitavax Powder Vitavax Single Solution			
Brome Grass	Vitavax Powder					
Canola						
Flax						
Mustard						

[1] Except Palliser

[2] Commercial seed treatment only

[3] Suppression only

FUNGICIDE SELECTOR CHART

Crop	Ascochyta	Blackleg	Botrytis Vine Rot	Cercospora Leaf Spot	Common Scab	Early Blight	Fusarium Decay	Late Blight
Peas	Bravo 500							
Potato		Easout PSPT Polyram 16D	Bravo 500 Bravo/Ridomil		Captan FL Formalin Polyram 16D	Bravo 500 Bravo/Ridomil Dithane DG Dithane M-22 Manzate 200 Polyram 16D Polyram DF Ridomil MZ Ridomil Gold MZ	Easout PSPT Manzate 200 Polyram 16D Tuberseal	Bravo 500 Bravo/Ridomil Dithane DG Dithane M-22 Manzate 200 Polyram 16D Polyram DF Ridomil MZ Ridomil Gold MZ Tattoo C
Soybean								
Sugar Beets				Dithane DG Manzate 200 Mertect Polyram DF				

[2] Commercial seed treatment only

FUNGICIDE SELECTOR CHART

Crop	Phytophthora	Pythium Seedling Blight	Rhizoctonia	Root Rot	Seed Piece Decay	Seedling Blight Seed Rot Damping Off	Verticillium Wilt Silver Scurf
Peas		Apron FL[2]		Captan FL		Agrox B-3 Agrox D-L Plus Apron FL[2] Captan FL DLC Thiram 75 WP	
Potato			Captan FL Formalin		Captan FL Easout PSPT		Easout PSPT
Soybean	Apron FL[2]			Captan FL		Agrox B-3 Agrox D-L Plus Captan FL DLC Thiram 75 WP Vitaflo 280 Vitavax Powder	
Sugar Beets		Apron FL[2]		Captan FL		Apron FL[2] Captan FL N-M Drill Box Thiram 75 WP	

[2] Commercial seed treatment only

FUNGICIDE SELECTOR CHART

Crop	Anthracnose	Ascochyta	Blackleg	Botrytis	Downy Mildew	Pythium Seedling Blight
Beans (Dry, Snap)				Benlate Rovral		Apron FL[2]
Cole Crops: (Broccoli, Brussel Sprouts, Cabbage, Cauliflower)			Vitavax rs Flowable			
Field Corn (FC) Sweet Corn (SC)						Apron FL[2]
Grasses						Apron FL[2]
Lentils	Bravo 500	Bravo 500 Crown				Apron FL[5]
Safflower						
Seed Alfalfa				Benlate		Apron FL[2]
Sunflower					Apron FL[2]	Apron FL[2]

[2] Commercial seed treatment only

[5] Low tannin lentils only

FUNGICIDE SELECTOR CHART

Crop	Root Rot	Rust	Sclerotinia	Seedling Blight Seed Rot Damping Off	Verticillium Wilt
Beans (Dry, Snap)	Captan FL		Benlate Ronilan DF Rovral	Agrox B-3 Agrox D-L Plus Captan FL DLC Thiram 75 WP Vitaflo 280	
Cole Crops: (Broccoli, Brussel Sprouts, Cabbage, Cauliflower)				Vitavax rs Flowable	
Field Corn (FC) Sweet Corn (SC)	Captan FL Manzate 200	Bravo 500[4]		Agrox B-3 Agrox D-L Plus Captan FL DLC Manzate 200 Thiram 75 WP (SC) Vitaflo 280	
Grasses				Thiram 75 WP	
Lentils				Crown	
Safflower				Thiram 75 WP	
Seed Alfalfa			Benlate	Apron FL[2]	Thiram 75 WP
Sunflower					

[2] Commercial seed treatment only

[4] Sweet corn only

Pesticide Application Record

Field description: ______________________ **Acres:** __________ **Crop:** __________

Variety: ________ **Date seeded:** ________ **Fertilizer:** ________ **Rate:** ________ **Date:** ________

Crop stage: ________ **Scouting date:** __________ **Date results were checked:** __________

Pest Weed/Insect/Disease		Density				Results	Field Diagram
Species	**Leaf stage/ Instar/Symptom**	**Patches**	**Low**	**Medium**	**High**		

Comments: ____

____

Application Information							Environment Information			
Pesticide Used	**Date and time**	**Rate per acre**	**Water volume per acre**	**Acres per tank**	**Pesticide volume per tank**	**Tanks per field**	**Crop stand**	**Soil moisture**	**Temp-erature**	**Wind speed and direction**
1 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		
2 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		
3 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		

Comments: ____

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Note: Ex. = Excellent G. = Good Fr. = Fair Pr. = Poor

Pesticide Application Record

Field description: ______________ **Acres:** ______________ **Crop:** ______________

Variety: ______________ **Date seeded:** ______________ **Fertilizer:** ______________ **Rate:** ______________ **Date:** ______________

Crop stage: ______________ **Scouting date:** ______________ **Date results were checked:** ______________

Pest Weed/Insect/Disease		Density				Results	Field Diagram
Species	**Leaf stage/ Instar/Symptom**	**Patches**	**Low**	**Medium**	**High**		

Comments: ______________

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Application Information							Environment Information			
Pesticide Used	**Date and time**	**Rate per acre**	**Water volume per acre**	**Acres per tank**	**Pesticide volume per tank**	**Tanks per field**	**Crop stand**	**Soil moisture**	**Temperature**	**Wind speed and direction**
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2 **Lot #:** ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		
3 **Lot #:** ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		

Comments: ______________

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Field description: ______________________ **Acres:** ____________ **Crop:** ____________

Variety: __________ **Date seeded:** __________ **Fertilizer:** __________ **Rate:** __________ **Date:** __________

Crop stage: __________ **Scouting date:** __________ **Date results were checked:** __________

Pest Weed/Insect/Disease		Density				Results	Field Diagram
Species	Leaf stage/ Instar/Symptom	Patches	Low	Medium	High		

Comments: ____

____

Application Information							Environment Information			
Pesticide Used	Date and time	Rate per acre	Water volume per acre	Acres per tank	Pesticide volume per tank	Tanks per field	Crop stand	Soil moisture	Temp-erature	Wind speed and direction
1 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		
2 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		
3 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		

Comments: ____

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Field description: ______________________ **Acres:** __________ **Crop:** __________

Variety: ________ **Date seeded:** ________ **Fertilizer:** ________ **Rate:** ______ **Date:** ______

Crop stage: ________ **Scouting date:** __________ **Date results were checked:** __________

Pest Weed/Insect/Disease		Density				Results	Field Diagram
Species	Leaf stage/ Instar/Symptom	Patches	Low	Medium	High		

Comments: ____

____

Application Information							Environment Information			
Pesticide Used	Date and time	Rate per acre	Water volume per acre	Acres per tank	Pesticide volume per tank	Tanks per field	Crop stand	Soil moisture	Temp- erature	Wind speed and direction
1 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		
2 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		
3 Lot #: ______							Ex. .... G. .... Fr. .... Pr.	Ex. .... G. .... Fr. .... Pr.		

Comments: ____

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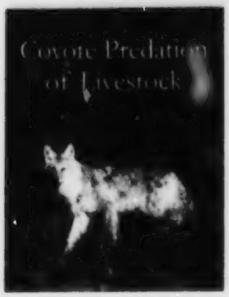

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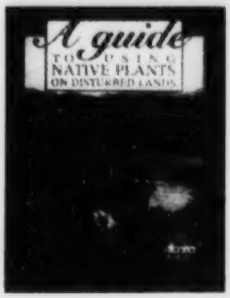
$30.00 (Available from Edmonton Publications Office only)



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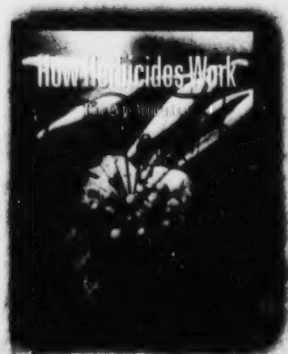

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